THE AMERICAN GAS LIGHT JOURNAL

PUBLISHED WEEKLY, AT NO. 42 PINE STREET.

VOLUME XCVI., No. 2.
Whole No. 1,909.

NEW YORK, MONDAY, JANUARY 8, 1912.

Subscription, $3 Per Year.
$4 Canada, $5 Foreign.

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PROCEEDINGS, SIXTH ANNUAL MEETING, AMERICAN GAS INSTITUTE.

HELD IN ST. LOUIS, MO., OCTOBER 18 TO 20, 1911.

FIRST DAY—AFTERNOON SESSION.

COMMERCIAL MOTOR DELIVERY: COST AND RESULTS.—*Continued.*

Comparative Cost of Horse and Motor Driven Vehicle and Cost of Operation.—It is difficult to present figures that will convey the advantages of the motor over the horse, for the demands made upon and met by the motor are such as we could not expect of the horse. The fields of transportation in the commercial world and of the public service corporation, have, in large cities and suburban districts, expanded beyond the limits in which a horse can be considered in the solution of the delivery problem. The question is not so much, "What is the cost? as *how* can I solve the problem in the most satisfactory way?" The motor is the only answer.

It has been proven beyond question that, where the problem is purely one of delivery, with both styles of vehicle moving continuously, a 1-ton truck will cover the mileage of two 1-horse teams, and in hot weather three 1-horse teams; in some instances more is claimed. From this we can arrive at the first cost of the equipment:

Cost of 3 horses, 2 to use 1 to spare.....	$750
2 wagons.....	600
2 sets harness.....	100
Total.....	$1,450

This is the same as the cost of a first-class, 1-ton motor truck. It is claimed, where experiments have been made, that the comparisons of mileage, load hauled, and cost are as shown by the next schedule. Like depreciation will apply to the best horse, wagon and harness equipment as to the best motor vehicle; that is, 10 per cent. to 20 per cent. per year, the average useful life of a horse being 5 to 10 years.

Comparative Cost of Hauling by Horses and by Motor Truck.

Vehicle.	Cost per Day	No. Tons Carried per Load.	Daily Aver. No. Miles.	No. Miles Loaded.	No. Ton Miles.	Cost per Ton Mile Loaded 1 Way Only in cents.
1-horse wagon and driver...	$4.00	1	22	11	11	36
2-horse wagon and driver...	6.00	3	20	10	30	20
3-horse wagon and driver...	8.00	5	13	9	45	18
1-ton motor truck.....	8.00	1	80	40	40	20
2-ton motor truck.....	10.00	2	70	35	70	14
3-ton motor truck.....	12.00	3	60	30	90	13
5-ton motor truck.....	15.00	5	50	25	125	12
7-ton motor truck.....	16.50	7	46	23	161	10¼
10-ton motor truck...	18.50	10	38	19	100	9¼

Motor vehicles to perform the same work, require only half the number of drivers, only about 1-fourth the storage room as compared with the separate spaces needed for wagons, horses, feed and hay and straw.

Comparative Cost of Motor and Horse Delivery.

A department store in Boston that adopted a system of motor truck delivery advances the following comparative analysis:

Investment Account Horse.			Investment Account Motor Truck.		
48 horses.....	$250	$12,000	12 1,000-pound machines.....	$2,500	$30,000
23 wagons.....	300	6,900	Garage equip.....		500
23 harness sets.....	75	1,725			
Stable equip		1,000			
		$21,625			$30,500

Annual Operating Expense.

Horse.			Motor Trucks.		
Interest 6 per cent..	$21,625	$1,297	Interest 6 per cent..	$30,500	$1,830
Depreciation—			Depreciation—		
Horses 30 pr. ct..	12,000	3,600	Machine 20 pr. ct.	30,000	6,000
Wagons 20 pr. ct.	6,900	1,380	Garage equip. 5 pr. ct	500	25
Harness, 25 pr. ct.	1,725	431	Maintenance—		
Stable equipment 25 pr. ct...	1,000	250	Machines 12 x 1 x 300		3,600
Maintenance—			Tires 12x331.20...		3,974
Feed 48x365x44.6.		7,814	Gasoline 12 x 80x 300		2,880
Shoeing, 48x365x 17.2		1,261	Garage help 4 pr. ct. 10x300.....		3,000
Stable help 48x365 x24.1.....		4,222			$21,309
		$20,255	Labor.		
Labor.			Drivers 12x2x300.	$7,200	
Drivers 23x2x300..	$13,800		Boys 12x5x52.....	3,120	10,320
Boys 22x5x52.....	5,720	$19,520			$31,629
		$39,775			
Stable.....	$1,620		Saving.....		33,551
Express.....	23,785	25,405			
		$65,180			$65,180

Comparative Analysis—Furniture Delivery Service.

Investment Account

Horse.			Motor Trucks.		
14 wagons	$250	$3,500	3 1-ton trucks at $2,400		$7,200
4 wagons (single)	265	1,060	Garage equipment		150
2 wagons (double)	300	600			
4 harness (single)	75	300			
2 harness (double)	125	250			
		$5,710			$7,350

Annual Operating Expense.

Interest 6 per cent.	$5,710	$348	Interest 6 per cent.	$7,200	$432.00
Depreciation—			Depreciation—		
Horses 30 pr. ct.	3,500	1,050	Machines 20 pr. ct.	7,200	1,440.00
Wagons 20 pr. ct.	1,660	332	Garage equip. 5 pr. ct	150	7.00
Harness 25 pr. ct.	550	138	Maintenance—		
Stable equipment	..	..	Machines 3 at $1 x300		900.00
Maintenance—			Tires		1,963.80
Feed 14x365x44.6		$2,279	Gasoline 3x90c.x 300		810.00
Shoeing 14 x 365x 7.2		368	Garage help 2 at $5x300		1,500.00
Stable help 14x 365x24.1		1,232			$7,052.80
		$5,742			
Labor.			Labor.		
Drivers 4x2x300	$2,400		Drivers 3x14x52	$2,184	
Drivsrs 2x14x52	1,456		Boys 3x8x52	1,248	3,432.00
Boys 6x8x52	2,496	6,352			
		$12,094			$10,484.80
Express		1,209	Saving		2,818.20
		$13,303			$13,303.00

Recapitulation.

Investment Account.	
Machines	$37,850.00
Horse	27,335.00
Increase	$10,515.00
Annual Expense Account.	
Horse	$78,483.00
Machine	42,113.80
Saving	$36,369.20
Total machine invest	37,850.00
Total horse invest	27,335.00
Total additional invest.	$10,515.00
Total machine invest	$37,850.00

Refunded in 3 months and 14 days by annual saving of 336,369.20.

Refunded in 12 months and 15 days by annual saving of $36,369.20.

And, in addition, the following advantages: Abolition of expressage within a radius of approximately 40 miles; in outlying districts, delivery direct to address and not to local station or store; increased business in outlying districts; abolition of stable.

After the expiration of 12 months and 3 days this installation will have paid for itself, and, with the reduction of $2,271 interest on investment previously charged, will earn for the organization $34,098.20 annually, and maintain itself permanently and in prime condition.

Limiting the Speed to Insure Long Life.—To guard against excessive speeds two methods have been devised. One is more effective than the other. The speed scale of a well-known "Speed Indicator," Fig. 11, makes it possible for the truck to be driven at a speed consistent with safety. When the maximum speed is reached the driver is confronted with the danger signal, "*Slow Down*," in big, red letters, easily read at a distance.

Another and more effective check on speed is a "governor" now applied to motors by many makers. This checks the flow of gasoline to the carburetor, when the proper speed limit is reached. Even with these devices the judgment of a driver cannot be spared, since a 6-miles pace on broken, rutty pavements can do more damage to a laden car than twice the speed on a smooth asphalt street. The right kind of driver "nurses" his truck over rough places, ruts and raised car tracks. Running at 12 miles per hour quadruples the shock of a 6-mile pace, since the ground is covered 2 times, and every obstruction is struck with double force.

The Man at the Wheel.—Right handling of the truck on the road is a matter of knowledge and honesty on the part of the driver. It is safe to say that 3 in every 4 cases of trouble which afflict motor wagons are due to neglect or failure to realize, on the part of owner and operator, that a power truck is not a combination locomotive and flat car. On the contrary, it is a machine, a compact, complex, special machine, which bears the same relation to ordinary shop equipment that a fine watch does to an alarm clock.

To bring the strength of 30 or 50 horses within the compass of a man's stretched arm, and hitch this amazing power to a 5 or 7-ton platform, without sacrificing handiness, requires the nicest balance of strength, size and weight in design and at least intelligent care in operation and upkeep. The business man who would not trust a slide-valve steam engine—the simplest of prime movers—to any but a qualified engineer will expect both economy and efficiency from a motor truck in the hands of a teamster whose training, at the best, covers 2 weeks or a month in the builder's local garage or drivers' school, and no longer than 2 or 3 days of instruction and demonstration on the road.

Overloading and Excessive Speed Are the Chief Dangers.—Commercial cars get no sympathy from their drivers. Because they are machines, too often they are "cracked through" as long as they will stand the strain and blamed during the remaining period of their existence. Because they do not balk or lie down, do not lose flesh or show wear-and-tear for some time after deterioration begins, owners who are reasonable in every other department of their business, overload them 50 per cent., drive them at excessive speed and make no provision for their proper inspection, cleaning and oiling. The care given a motor vehicle, on the road and in the garage, has so much to do with its working efficiency and cost, that owners would do well to study its limitations as well as its possibilities.

Tire Maintenance.—Owing to the important part claimed by tires in the operation of motor vehicles, the writer believes prominent attention should be given the subject by users. A schedule of sizes of tires and weights they are to carry here listed, is considered almost standard among tire manufacturers.

Air Pressure for Inflating Pneumatic Tires and Carrying Capacity Per Wheel of Standard Sized Tires.

Diameter of Tire, Inches.	Maximum Weight on Wheels, Pounds.	Air Pressure in Tire Pounds per Square Inch.
2½	225	50
3	350	50
3½	600	60
4	750	70
4½	1,000	80
5	1,000	90

Carrying Capacity per Wheel of Standard Sized Solid Tires.

Diameter of Tire Inches.	Maximum Weight per Wheel Pounds.	Total Weight Truck and Load.
2	500	2,000
2½	750	3,000
3	950	3,800
3½	1,375	5,500
4	1,750	7,000
5	2,000	8,000
6	3,000	12,000
7	4.000	16.0 0

Care of Pneumatic Tires.—The care of tires can only be touched upon here. Fortunately for owners, the competition among tire manufacturers makes it possible to get good results and satisfactory treatment by consulting them. In cases of serious tire trouble they will be glad to suggest remedies that will lengthen the life of the tire.

In general, besides overloading and speeding, the chief cause of tire depreciation are: Contact with oil, flying starts and abrupt stops, unequal brake pressure, fast running in street car tracks, and the usual failure to adapt the pace of the car to the condition of the street or roadway.

A representative of a leading tire manufacturer offers the following suggestions: "There isn't a tire maker in the world who can turn out tires that will stand up under the usage some drivers give them. We will always have trouble from reckless drivers. Fifty per cent. of all pneumatic tires that go to pieces do so, not because they are worn out, but because they receive careless handling. Every time a driver applies his braeks with violent force, causing his wheels to scrape along the roadway, he inflicts an injury to the tread that cannot help materially reduce the mileage he should get out of the tires. The same applies to faulty starting of the car.

The grinding effect exerted on the tires, when running in street car tracks, or scraping along the edge of a curb in stopping, is also sure to lessen the strength and wearing qualities of the tire. Driving around corners at a high enough rate of speed to cause the wheels to skid is also a fruitful source of wear. The speed at which a car should be driven is a question every motorist has to settle for himself. His

pocketbook is usually the reckoning basis. High speed produces high cost of tire maintenance. There is no dodging the fact. Speeding and tire economy have absolutely nothing in common."

Some tire makers, with the education of the motorist in view (and the increased sale of their goods), guarantee tires under certain conditions, for a limited mileage, for a specified length of time. With each tire sold they issue a certificate which induces the purchaser to become familiar with the chief causes of tire depreciation. A prominent place in the certificate is given to the fact that the tire is guaranteed for blank miles against "blow-outs," rim cutting and blistering, but the tire must be properly inflated at all times, in accordance with the schedule of air pressure referred to in this paper.

Another condition which governs the guarantee is that, in case of puncture or other trouble which may cause deflation, the tire must not be ridden upon. Rim cutting is sure to result. Damage occasioned by misuse, abuse, neglect, or by contact with any obstruction in the road, is not covered by the guarantee, and such damage should be repaired when noticed. Under the schedule of mileage allowance given on the certificate, the tire is presumed to have furnished an average of 25 miles per day. Where these conditions have been adhered to, there has usually resulted good service from the tire.

Care of Solid Tires.—In the matter of depreciation of solid tires, we believe tire makers are also working to establish some basis of guarantee. In one instance, a well-known tire is guaranteed for blank miles usage within 6 months from the date of its purchase, irrespective of the conditions under which it is used. The recent report of the Committee on Electric Vehicles, read before the National Electric Light Association in New York city, contains the following:

"Your Committee has taken up the question of efficiency of tires on pleasure vehicles, and would report that there is a difference of from 30 to 70 per cent. between the heavy gasoline type of tire regularly sold and the best special electric tire on the market. This difference in tire efficiency means that, with the best tire as against the heavy gasoline tire, nearly double the mileage and double the life of the battery are obtained, if the vehicle is given proper attention."

Percentage of Time Out of Service.—Referring to the replies, "Percentage of time out of service for repairs," it will be noted with pleasure that experience has shown the average to be not over 10 per cent., and we believe it is safe to assume that at least 5 per cent. of this time was consumed in the annual examination, cleaning and repainting of the car, and the other 5 per cent. would be divided between repairs to the motor and repairs of tires.

It is doubtless true, that there are many cases where a car or truck has been purchased and placed in use in a city where repair parts are not to be had, and time must be consumed in awaiting the arrival of parts from the factory. With the increase of motor delivery this will become more apparent—that the matter is being given serious consideration, will be noted from the following editorial upon, "Unit Construction:"

The Editor of the *Commercial Car Journal*, in a recent issue states, with reference to the solution of continuous commercial car delivery:

"The pleasure car owner thinks nothing of laying off his machine for a week or even 10 days, awaiting a part, but if this same thing happens to a commercial car user, there is immediately a 'time' with the agent or the manufacturer of the machine because this inactive truck is in all probability causing a loss to the owner of anywhere from $10 to $20 per day, while the pleasure car owner was simply inconvenienced.

"It is generally conceded that something must be done in the car field which will positively do away with expensive delays occasioned by the necessity for renewing vital parts of the mechanism. It is true that careful daily inspection and up-to-day service department and relief methods make it possible to keep a well-built machine almost continually on the job. Yet in spite of these precautions, expensive and annoying delays will occasionally take place.

"It is very gradually dawning upon designers that the removable unit system is a sure cure for all these ailments. Some designers actually believe they are using removable units in the cars of their construction. The question arises, what constitutes a removable unit? Is an engine which is bolted, and lock-nut and cotton pin retained in the frame, a removable unit? Certainly it is not in the sense in which we use the term. Under such a definition almost any part of a vehicle might be termed a removable unit.

"By 'removable' we do not simply mean that in half an hour or an hour a crew of men, with a machine equipment back of them, can remove the offending part, leaving an aching void in which nothing will fit. Such a removable part has no place in rapid car transportation. To be really removable the part should be so arranged that strapped, winged-nut and cam-fastened binding or holding parts are all that are required to firmly anchor the removable portion in place. The alignment and the positional relation of the part to the rest of the mechanism should be automatically cared for by the mere act of tightening the strap, wing-nut or cam-binder."

The writer then refers to European practice and road conditions, and tells of the future emergency wagon with a complete equipment of parts which it will carry, and concludes with this statement: "It may seem to some that these are rather radical statements, but there is very little doubt that these rapid renewal possibilities must be perfected, before the best can be hoped for from a commercial car installation."

Standardization in Construction.—In this connection it may be of interest to note that the Society of Automobile Engineers now has a membership of about 800 of the ablest engineers and experts having to do with the automobile industry, and, within the past year, has accomplished results which will be found to have made history of a definite nature. Those who have used motor cars or trucks are only too well aware of the fact that there has been apparently no attempt at standardization of any of the small parts which go into the construction, aside from tires and other accessories, and will all welcome results that will be attained by this Society.

There will be no attempt by the Society to throttle original research as to changes in engines, or in transmission, or any portion of an automobile. This does not alter the fact, however, that it is better to have a novel engine or novel transmission made up of component parts which are standard and well tried out, than one which is not only novel in design but one in which every element is novel and untried.

The Society stands ready to assist in manufacturing difficulties and necessities in any of the many engineering fields of automobile production. As an example, the manufacturers of electric lighting systems for automobiles recently applied to the Society to take up the matter of standardizing certain features of the lighting system, and this matter was promptly taken care of.

Fire and Accident Insurance.—There seems to be no question as to the advisability of carrying insurance. The replies are largely in favor of doing so. Irrespective of whether insurance is carried or not, we believe it good policy to carry a small, portable, hand-fire extinguisher on the gasoline machine, where it is easily accessible in case of emergency. Dangerous fires may originate from leakage of gasoline in the piping system, or "back-firing" in the carburetor. We believe the majority of such fires could be readily extinguished if small extinguishers were carried with the trucks.

The report of the Committee on Electric Vehicles, mentioned elsewhere, refers to the fact that "Liability insurance companies are beginning to realize the difference between a gasoline car and an electric, as far as liability insurance is concerned. The commercial gas car can run, and often does run, twice as fast as the electric. The gasoline pleasure car frequently makes from 45 to 60 miles an hour, while the maximum speed of the pleasure electric car is between 20 and 25 miles. The electric is under perfect control, and its freedom from extra levers, intermediate gears, etc., makes it so simple of operation that, in case of emergency, the operator does not become confused as to which operation to perform.

Because of the lower speed when collisions occur, the impact is less severe and the damage consequently slight. The heart of the machine (the motor in the electric) is under the car and out of harm's way, while the engine in the gas car being in front is subjected to serious damage when a collision occurs. Absence of inflammable fluid in the electric makes a fire practically impossible. The fire insurance companies recognize this latter feature and allow electric trucks on wharves, docks, in sheds and warehouses, where the gas truck is prohibited.

"The freedom from fire in a garage which is strictly electric as compared with the gasoline garage is almost self-evident, and the fire insurance companies are beginning to make a rate accordingly. The electric vehicle is no more hazardous from the fire standpoint than the horse and wagon, in fact, probably less so, for, with the electric vehicle, there is no inflammable hay stored to feed the flames when once started."

Depreciation. Gasoline Vehicles.—When you keep a motor in first-class repair all the time, replacing worn parts as they show, what reason is there for charging a high annual depreciation? This question is raised in some of the reports received, while others state, that at least 33⅓ per cent. of the cost should be charged off annually on gasoline cars. Opinions appear to vary, but the majority consider 15 per cent. the proper figure. This does not include tires which are generally conceded should be listed under running expense.

Depreciation may be considered in different ways. That is, many trucks as constructed to-day will be obsolete within two years, and if used only slightly would not sell for 50 per cent. of their original cost within a year.

Is *depreciation* on a well-built truck not largely a matter of operating expense, and should it not be charged off according to mileage. For instance, the reports show 30 miles per day to be the aver age distance travelled, which amounts to about 9,000 miles per year It is generally conceded that the well built vehicles are good for 7 years, or about 60,000 miles. As an actual fact many trucks are in use to-day that have covered double this mileage and are still in good condition.

Fifteen per cent. for 9,000 miles=1¼ (nearly 2 per cent.) 1,000 miles. Using 2 per cent. for a basis, the following schedule may apply:

	Value.	Depr. Cost per Mile.
Under 1 ton trucks	$1,000.00	0.01¼
1 ton trucks	1,250.00	0.02
2 ton trucks	2,400.60	0.04
3 ton trucks	3,000.00	0.05
5 ton trucks	4,000.00	0.06¾
10 ton trucks	6,000.00	0.10

Many companies reported 15 per cent. first year, 25 per cent. second year, and 30 per cent. for third year as a basis; others reported 15 per cent. annually, reducing the annual remaining value each year. This would not prove satisfactory. As an example, 15 per cent. per year on the original cost would depreciate the total in 6 years, 8 months, while in the latter plan suggested, at the end of the same period one-third of the original value would still remain.

Depreciation Electric Vehicles.—Referring to the reports, the indications are that opinions again vary; but not widely. Some companies prefer to charge enough on the maintenance to cover this item, others vary the amount under tires, battery and wagon body. The smaller number of exposed wearing parts and the lower speed at which they are operated, are large factors in favor of the longer life of an electric vehicle. See Fig. 5.

It is interesting to notice, in connection with electric vehicles, although the depreciation is low and the operation costs seem satisfactory, that ¾ of the electric trucks reported were those from combination gas and electric companies. It is assumed that the determining factors in the selection of electric trucks by them, may have been from the fact that they had a competent man to place in control of the charging and attention to batteries and that they were selected because of the advertising value attending their use. Their intention may also be to popularize their adoption by present users of other delivery equipments and increase the sale of electric current.

Finding the Truck You Need. It is evident, from the reports received, that the managers of many companies are seriously considering the introduction of motor service at an early date.

Before purchasing, a number of significant facts should be taken into consideration, since choosing the right truck is the beginning of economy in motor delivery. When you purchase the power wagon it is not enough to assure yourself that the design is good, the con struction honest, the makers responsible and the experience of other users such as to guarantee your own success in operating it. It is better to pay more to the manufacturer than to the garage repair man. Do not buy a truck because it is low priced. You need to make sure, also, that the truck is the type and size best adapted to the kind of service you require. The only way to accomplish this is to analyze your hauling problem, *know* what you want and pick the truck which has made good under similar conditions in actual use.

It is apparent that the experience which has been unsatisfactory has been due to the fact that the gas companies have either selected trucks which were unsuited to their requirements, or else have remodeled second hand touring cars by simply substituting commercial bodies for delivery purposes. No changes have been made in the sizes of tires, or the gear ratio, to reduce the speed at which the truck may be operated In many cases the springs have not been strengthened for the different services required of them, nor shock-absorbers or supplementary springs installed to meet the new conditions. Owing to this many light delivery trucks have proven unsatisfactory.

Motor trucks are not yet either perfect or foolproof machines; but there are many good ones, and the types, designs and capacities are so varied that the man who knows what he wants can find the right truck to save him money and improve his service. Several years' experience, observation and experiment are behind the conclusions here offered in the selection of light delivery, gasoline trucks.

Size of Wheels and Tires.—The size of wheels, for example, bears directly on the cost of tires, the most important single item in the upkeep of a power wagon. Most wheels are too small; they should be at least 38 inches. With larger wheels a longer section of the tire engages the pavement, the load per cubic inch of rubber is less, traction would be better and friction less. The larger wheels would also have the effect of smoothing out defective pavements.

Springs.—To be thoroughly serviceable a spring should possess two essential qualities in due proportion, good resistance and resilience. That is, a spring should move from its idle point very quickly and be so constructed that, under unusual stress and strain, heavier and stronger proportions of the springs would be brought into play. With a horse-drawn vehicle we have only to provide against a maximum roughness of the road with a minimum speed, and railroad trains have only to contend against a maximum speed over a minimum road roughness. When we come to the motor vehicle we have to provide both for maximum speed and maximum road roughness. The springs of trucks of 2 or more tons capacity are generally satisfactory, but in the light delivery wagons more attention should be given to this subject. The writer believes in flexible springs with proper supplementary springs or shock absorbers. With this equipment the vehicle will be found satisfactory under varying loads.

Road Clearance.—Be careful to purchase a truck with at least 15-inch road clearance. In winter during heavy snow falls a good power truck will go anywhere with a load that it will carry in summer, if the axles and underbody will clear the tops of the drifts. If not, the truck becomes a snowplow.

Engine Construction.—After 4 years' experience with power vehicles equipped with 2-cycle engines the results obtained have been more than satisfactory. The few wearing parts of the motor have made the repair bills very low. The motor is unit construction, and, in 2 types of cars used, is installed in front under the hood, where it is readily accessible. The chassis of the truck, shown in Fig. 12, illustrates this more fully.

Air Cooled.—The motor is air-cooled. the air being drawn through the front of the hood by a suction fan which is integral with the flywheel at the rear of the engine, as shown in Fig. 13. The hood is so constructed that the air reaches all the cylinders uniformly. None of the trouble has been experienced which is possible with a water-cooled system with radiator; in the varying weather conditions of winter, there is no water to freeze.

Ignition.—The ignition system is very simple. There are no wires or coils under the body of the car; the magneto is direct-connected to the crankshaft in front of the engine; the wires are extended direct from the magneto to the spark plugs.

Lubrication.—The lubrication system is very simple, the proper proportion of lubricating oil being mixed with the gasoline in the main tank and fed to the engine through the carburetor. This obviates the difficulties arising with the usual oiling systems. The bearings of the engine are fitted with individual oil cups.

Transmission.—The transmission is of pla netary type and is readily adjusted in a few minutes. A motor vehicle of this type seems to eliminate nearly all the causes of trouble originating in the construction of the ordinary light motor vehicle, and it is surprising that many companies are slow in adopting it. In fact, only 3 gas companies report the use of a vehicle of this type, but they agree that the cost of operation and depreciation of the car is lower than most other gasoline motors of the 4-cycle type. Recently in examining a 2-cycle engine, which had been in operation 4 years, and travelled 18,000 miles, the interiors of the cylinders were found as perfect as when new. Many department stores and motor service co mpanies, requiring a fleet of several cars, have adopted this 2-cycle motor form of truck, and hundreds in use have shown a low cost of operation and depreciation with inexperienced drivers.

Supervison of Driver.—The average driver needs some supervision. The writer believes it wise, if 4 or more trucks are in use, to employ a mechanic to have direct supervision over the trucks and make adjustments and repairs daily as are necessary. He will be able to keep the motors at the top notch of efficiency, keep them in service nearly every day in the month, add years to their life, and save a good part of his wages on supplies and repairs and eliminate the necessity of an annual overhauling.

The average driver will handle his truck more carefully, if he has a daily check system on his operations; and will waste less oil and gasoline if he is reporting on forms illustrated in Figs. 1, 2 or 3. The reason is that this report focuses the driver's attention on the chief factors which count in his day's work. If not enough trucks are owned to maintain a mechanic, it would be a good investment to pay a competent driver extra, for making daily after-hour inspections of the trucks in service. Paying drivers for overtime work is cheaper than securing an outside expert, and it concentrates his attention more upon the responsibility of keeping the truck in service. His

thoughts are directed to the wearing parts, and you are almost certain to get better results.

Appreciation.—The writer desires to express his appreciation of the service rendered by those who have assisted in the preparation of this paper. Editors and publishers of auto journals have given advice and information. Manufacturers have loaned electrotypes and specifications of cars. Members of the Institute and others have been generous in their co-operation by furnishing all the information they had. In some instances this entailed much labor and care in its preparation.

It is the hope of the writer, that the paper submitted will be of aid to some fellow gas man and in the words of a leading auto advertiser, help him "Make 2 minutes grow, where only 1 grew before."

(To be Continued.)

(Continued from page 7.)

Insulation as a Means of Minimizing Electrolysis in Underground Pipes.

[Prepared for the Sixth Meeting, American Gas Institute, by DR. E. B. ROSA and MR. BURTON MCCOLLUM.]

The advantages of the cone over a rod or pipe are these:

1. The surface being more nearly flat is easier to paint uniformly. There are no ends or sharp corners where defects may appear. 2. After painting it can be laid down anywhere to dry and there is very little chance of its being bruised in handling. 3. To measure the electrical resistance and dielectric resistance of the coating the cone can be filled with electrolyte and the voltage applied. The results will be free from inaccuracies due to sharp corners. The same applies to long time tests on low voltages and also does away with the necessity of any containing vessel for the specimen.

The tests applied were as follows:

1. Preliminary tests for pinholes and flaws. This test consisted in filling the cone to about ¼-inch from the rim with a weak solution and applying 80 volts alternating current for 30 seconds immediately after filling; the difference of potential being applied between the sheet iron of the cone and the electrolyte. An alternating current mil-ammeter placed in the circuit gave a kick of the needle if the coating was defective. Only those specimens which showed no defects under 80 volts pressure were used in succeeding tests.

2. Resistance measurement of the paint coating. This test (and those following) were applied to specimens which survived test No. 1. The measurement was accomplished by filling the cone with mercury and measuring the resistance between the sheet iron of the cone and mercury by means of a Wheatstone bridge.

3. To test for the effect of dampness alone, or the effect of various chemicals on the paint coating, the cone was filled with the desired solution and allowed to stand Electrical resistance measurements from time to time showed the decrease of protective value of the paint by absorption of moisture or chemical action by a decrease of resistance.

4. To ascertain the effect of continuous electrical stress on the paint coating in the presence of moisture the cone was filled with tapwater, or other electrolyte as desired, and a continuous electrical potential of four volts applied by attaching one terminal of a storage battery to the sheet iron of the cone and the other to a small copper electrode placed in the tapwater but not touching the paint. This subjects the paints to practically the same conditions as those which prevail with pipe coatings in actual service where there is a difference of potential between pipes and ground, the four volts used in the tests being a value frequently met with in practice. In testing each paint two specimens were made. In one of these the iron was maintained positive and the other negative so that the behavior of the paint with current tending to flow both to and from the iron could be determined. The term "breakdown" as used in connection with this test means the appearance of a failure in the coating of paint which allowed a measurable current to pass. The measurements of current were made with a mil-ammeter having a total scale reading of 0.0 0 5 amperes or 0.00001 ampere per scale division. The specimens were left in circuit long enough after breakdown to determine definitely that the current was passing through the coating and not creeping over the edge of the cone.

It seems improbable that any coating of paint which withstood test No. 1 successfully would contain any flaws or pinholes. Any weakness which developed later could reasonably be supposed, therefore, to be inherent in the paint itself. As to test No. 4 it can not be said that this is too severe in view of the conditions imposed upon paint coatings in practice where electrolysis conditions prevail, but on the contrary conditions even more severe than this are often encountered under service conditions. It follows therefore that those paints which have failed under these tests cannot be relied upon as a protection against electrolysis.

The results of the tests to date are shown in Table III. Out of the 16 different kinds of paints and pipe dips thus far tested, using 40

TABLE III.

Paint Number.	Cone Number.	Number of Coats.	Res. in Ohms per Sq. Cm.	Solution in Cone,	Volts, Time Test.	Polarity of Cone.	Hours to Breakdown.
1	1	4	72×10^{11}	2 pr. ct. Na_2CO_3	4	Positive	312
	2	4	72×10^{11}	Tapwater	4	"	384
2	1	4	72×10^{11}	2 pr. ct. Na_2CO_3	4	"	192
	2	4	1.6×10^{9}	Tapwater	4	"	.. .
3	1	4	72×10^{11}	½ pr. ct. H SO,	4	"	312
	2a	4	72×10^{11}	Tapwater	4	"	See foot-note
4	1	4	3×10^{10}	½ pr. ct. H_2SO_4	4	"	528
	2	4	Failed under 80 volts.				
	3b	5	3.6×10^{10}	Tapwater	4	Positive	See foot-note
5	1	5	7×10^{9}	3½ NaCl	4	"	840
	2	5	3.2×10^{9}	Tapwater	4	"	120
6	1	5	10.8×10^{9}	2 pr. ct. Na_2Co_3	4	"	5
	2	5	3.2×10	Tapwater	4	"	7
7	1	4	1.7×10^{9}	2 pr. ct. Na_2CO_3	4	"	5
	2	4	7.7×10^{8}	Tapwater	4	"	240
8	1	4	2×10^{11}	½ pr. ct. H_2SO_4	4	"	5
	2	4	5.5×10^{10}	Tapwater	4	"	552
9	1	4	4.5×10^{8}	"	4	"	384
	2	4	3.6×10^{8}	"	4	"	....
10	1	4	1.2×10^{9}	"	4	"	....
	2	5	2×10^{11}	"	4	"	668
11	1	4	1×10^{9}	"	4	"	7
	2	4	6.6×10^{7}	"	4	"	30
12	1	4	1×10^{10}	"	4	"	7
	2	4	Failed under 80 volts.				
	3	5		" " "			
13	1	Pipe dip e	2.8×10^{10}	Tapwater	4	Positive	7
	2		2×10^{11}	"	4	"	7
	3		2×10^{11}	"	4	"	96
	4c		2×10^{11}	"	4	"	See foot-note
14	1d		2×10^{11}	"	4	"	" "
15	1d		2×10^{11}	"	4	"	" "
16	1	4	3×10^{7}	2pr. ct. Na^2CO_3	4	"	24
	2c	5	1.6×10^{7}	Tapwater	4	"	See foot-note
	3	4	Failed under 80 volts.				
17	1	4		" " "			
	2	5	2.2×10^{9}	Tapwater	4	Positive	48
	3	5	....	....	...		....
18	1	5	9×10^{7}	Tapwater	4	"	48
19	3	4	1.6×10^{9}	"	4	Negat'e	216
20	3	3	5.6×10^{9}	"	4	"	192

a. No break to date or 1,680. b. No break to date or 648 hours. c. No break to date or 668 hours. d No break to date or 1,904 hours' e, 3 layers treated felt and composition.

specimens, but one seems to be holding out for any considerable length of time, even under the mild conditions of the test. This is specimen 2 of paint No. 3 which has not yet failed. The first failure occurs in a single spot, raising a blister, and, in the case of anode, rapidly eating a pit in the metal. If the specimen is left in circuit with constant voltage applied the coating ultimately breaks down in other spots and the pitting extends over the entire surface.

The failure of the coatings is strikingly shown in Fig. 3, which shows photographs of 3 typical specimens. The 2 outside specimens were both subjected to a pressure of 4 volts, one was anode and the other as cathode, while the specimen in the middle coated with the same paint was merely immersed in the electrolyte during the same peri d without any difference of potential being applied. The latter appears to be in perfect condition, whereas the other two are completely destroyed. The explanation of the phenomena lies in the fact that none of the paints tested are absolutely impervious to moisture, and when brought into the presence of water a slight trace of moisture ultimately penetrates clear through the coating. When this occurs the coating becomes slightly conducting at that point, and if an electromotive force is applied a trace of current flows at first, giving rise to slight electrolysis, which is accompanied by the formation of more or less gas beneath the coating. As this gas increases in amount and expands the coating is ruptured, after which the flow of current is greatly increased at the point of break-down and rapid electrolysis of the exposed iron follows. In some cases, if the coating is sufficiently porous to permit the gases to escape, it may remain intact, and electrolysis may continue beneath the coating, eating clear through the metal without any superficial evidence of failure of the paint. This phenomenon is frequently met with in practice. The vital weakness of all the paint thus far tested is due to this single fact that none of them are entirely non-absorbent. If a paint could be secured that was absolutely impervious to soil moisture, and which would remain so for an indefinite period, it would prove an effective preventative of electrolysis, and all efforts to produce such a protective paint should be directed to the one point of making it absolutely and permanently moist-proof.

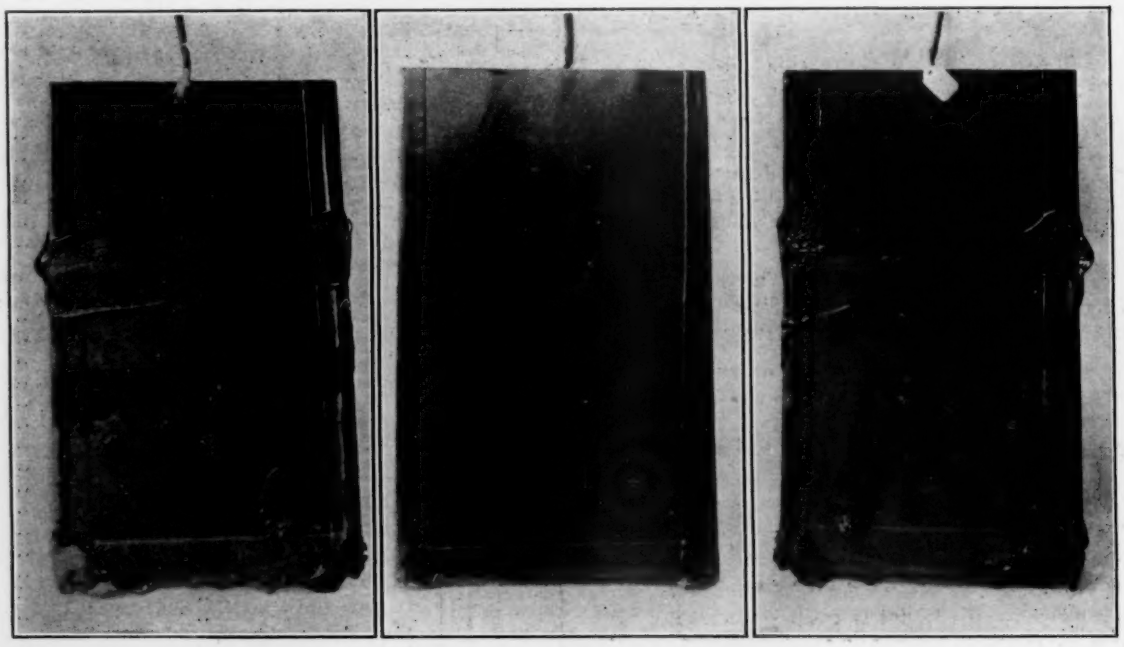

Fig. 3.

Many manufacturers of paints now on the market claim that their product is entirely moisture proof, and will often present elaborate experimental data in support of their contention. In practically all cases, however, these tests, while sufficient to show that the paints possess considerable power to resist moisture, are not sufficiently delicate to determine whether or not they are capable of meeting the severe conditions required in protecting pipes from electrolysis. The electrical test carried out as described above is an extremely sensitive one, and is the most reliable test with which we are acquainted for determining the value of a paint as a protection against electrolysis, and any paint that will not endure this test, for many months at least, should not be relied upon for this purpose.

The manner in which these paints usually fail under electric stress shows that they might, under certain circumstances, increase the trouble from electrolytic action. Breaking down, as they do at isolated points, the discharge of current from the pipes is concentrated at these points and the pitting is likely to be more serious than if the paint were not used at all. In all areas, therefore, where the pipes are strongly positive to earth, these paints are likely to do more harm than good, it would be better to omit them altogether. In places where the pipes are practically neutral, or negative to earth, they can do no harm, even if they do fail in spots, and in such places they may be of value in reducing the flow of current in the pipes and in preventing soil corrosion.

Another method of insulating pipes that has frequently been used is by the application of treated papers or textiles to the surface of the pipes. A complete series of tests of such materials is planned, and some of the tests are now under way; but in most cases they have not proceeded far enough to yield positive results, although it may be said that, in most cases, the results to date are very much more promising than those obtained with paints and dips. This is doubtless due mainly to the fact that a better and more uniform coating can be obtained with these materials. Specimens Nos. 14 and 15 of the table belong to this class. Some experiments which we have had in progress for some time in connection with the waterproofing of concrete are of interest here.

Concrete specimens, waterproofed with 3 and 5 layers of felt treated with asphalt and interspersed with layers of asphalt compounds, after standing in water for 4 months show no sign of electrical conductivity through the coating and the absorption of water has been extremely slow. With 2 layers of the felt and compound slight conductivity has developed in 2 specimens out of a total of eight. These coatings have been subjected to an electrical stress of 15 volts continuously. The average absorption for those specimens waterproofed with 3 layers of the felt compounds has been 53 grams per square foot of surface. Forty-one grams of this were taken up during the first 2 months of the test and 12 during the last 2. These tests show that they slowly absorb moisture, so it seems altogether probable that their failure is only a question of time. The thicker such coatings are made the longer will be the time required for trouble to develop, and in certain cases, where the cost is not prohibitive, it may be possible to protect the pipes for a considerable time by the application of a sufficiently heavy coating. This has been accomplished in some cases where the pipes have been laid in a trough and the trough poured full of pitch. If a good grade of pitch and a sufficiently thick wall be used the pipe may be protected for several years, but the protection should at best be regarded as a temporary one until further and more favorable experimental data are obtained.

These tests are to be continued until all available paints, dips, and wrappings that are recommended for the protection of pipes have been thoroughly tested. In the meantime if any manufacturer or any engineer has obtained results with these coatings differing from those given above we should be glad to be informed of the fact and to make a full investigation of the cause of the discrepancy.

Another method of reducing current flow in pipes (one which has found extensive application within the last few years), is that of breaking up the continuity of pipe lines by the use of insulating or resistance joints. In ordinary wrought iron or steel mains with screwed or riveted joints the resistance of the joints is usually small in comparison with that of the pipes, and when such pipes are laid in localities where there is an appreciable potential gradient in the direction of the pipe, currents of considerable magnitude will usually be carried by the pipes. In the case of cast iron mains using lead joints, the resistance of the joint is often as great or greater than that of a section of pipe, and it is not uncommon to find a lead joint having resistance equal to that of several hundred feet of pipe, and it is due largely to this fact, and to the higher electrical resistance of cast iron, that such pipes carry considerably less current under similar conditions than wrought iron or steel pipe. The frequent injury to cast iron pipes by electrolysis has shown, however, that the resistance of lead joints is far too small to reduce the current to a safe value, even under ordinarily severe conditions. Attempts were, therefore, made to still further reduce the current in the pipes by the introduction of specially designed joints of high resistance.

Following the earlier attempts to prevent electrolysis by this method very strong claims were made for it by some of its advocates, some of them claiming that they had completely solved the problem by the use of insulating joints. Within a few years, however, a noticeable reaction set in, many engineers criticising the method, and some of those who were its warmest advocates in the beginning abandoned it. It is but natural, however, that the initial attempts to apply this method should have resulted in some disappointments, and it is not safe to consider these early failures too seriously in judging the value of the method when properly applied. At that time no experience had been gained in regard to the frequency with which such joints should be used, the proper location of the joints, the kinds of joints best suited to certain conditions, and the complications arising from the presence of other pipe systems not so insulated. All these are important factors and must be carefully considered if the maximum of protection is to be secured at a minimum

cost. Despite the criticism it has received in some quarters, the method has steadily gained in favor, and is more frequently encountered at the present time than ever before.

A number of cases have come to our attention where systems in which insulating joints have been installed have, nevertheless, suffered severely from electrolysis. In every case that we have examined, however, there has been good reason for believing that the trouble was due, either to the use of an insufficient number of joints, or to the fact that they were not located in such places as to be most effective in reducing danger. A very common procedure has been to place, in a pipe line running at right angles to the track, a single insulating joint on either side of the track, and a few feet therefrom, and to assume that this insulating joint should prevent current from getting from the railway tracks into the pipes, beyond the joint. The reason why this might fail to protect the pipes in many instances can be seen by reference to Fig. 4, in which the dotted lines and arrows

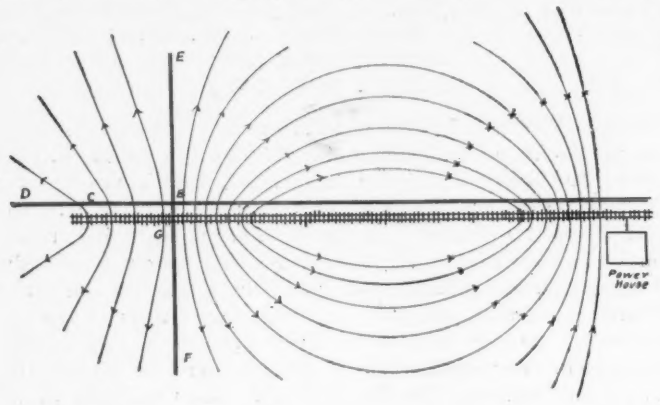

Fig. 1

indicate the general direction of the flow of current in the earth in the case of a simple straight line railway free from any complicating circumstances, such as pipe systems, nearby railways, etc., and in which the load is assumed to be well out toward the farther end of the line. It will be seen that, at points near the power house, current tends to flow into the tracks from the surrounding earth, and at the farther end of the line the current tends to flow radially outward in all directions, at the extreme end of the line, the direction of current flow being in a direction away from the power house. If we measure potential gradients in the region indicated by *B*, *E*, *F*, *C*, *D*, we find that very considerable potential differences exist between different points of the earth, as between *G* and *E*, or between *C* and *D*. As a rule when track conditions are good these potential differences will be high only near the track, becoming quite small at distances of 50 or 100 feet or more from the track. Under some circumstances, however, as with heavy loads, or with a bad condition of the track between *A* and *B*, potential gradients of considerable magnitude may exist between points located at a considerable distance from the track; as, for example, between *B* and *E*. An insulating joint placed at *B* will, of course, reduce greatly the current that will flow in the pipe from *A* to *E*, and if the potential gradients are small enough the single joint at *B* may be sufficient to reduce the current to a value that will do no harm. If, however, due to any of a number of conditions that may arise in practice, the potential gradients in the earth should not be low, there may be sufficient difference of potential between the points *B* and *E* to cause considerable current to be picked up by that portion of the pipe, and thus give rise to electrolysis in the region beyond the joint *B*. Similarly, between *C* and *D*, we may have, at points entirely beyond the terminus of the railway system, the condition of currents flowing in the pipes away from the power house, even though an insulating joint may be placed at *C*, and if conditions at points beyond *D* should be such as to cause this current to be discharged locally serious electrolysis might occur at points remote from and entirely beyond the range of the system. The mere fact, however, that insulating joints at the points *B* and *C* will not entirely prevent such conditions from arising is no valid evidence that such joints are of no value, although they have often been condemned because electrolysis has occurred under conditions exactly similar to those outlined above. It simply means that, after the joints at *B* and *C* were installed, there still remained extensive areas where pipes were laid in soils in which there were considerable potential gradients parallel to the pipes. There being no insulating joints in those areas currents must inevitably flow in the pipes. If a suitable number of insulating joints had been properly distributed between *B* and *E*, and between *C* and *D*, these currents could have been kept down to any desired value and the trouble avoided.

In determining by actual experiment under practical conditions just how effective insulating joints may be in reducing currents in pipes, it would be very desirable to select a particular insulation and make a complete survey of the system, including current measurements in the pipes, and then, install, at points indicated by the survey, a complete system of insulating joints, after which the current measurements in the pipes could be repeated, and thus unquestionable data be obtained as to the effect of insulating joints on the current flow. We have not as yet been able to carry out a test of this sort, but it is hoped that in the near future arrangement can be made for carrying out an investigation of this kind under actual conditions. We have, however, in connection with other lines of field work, made excavations and measured the flow of current in pipe lines provided with insulating joints at more or less frequent intervals, and by comparing these with similar measurements on lines not provided with insulating joints, but otherwise similarly situated, a good general idea may be gained as to the extent to which the currents are reduced by the joints. In making such measurements the method used was the one most commonly employed by engineers for this purpose; viz., to expose a portion of the pipes between adjacent joints and with a milli-voltmeter measure the drop of potential between 2 points a measured distance apart. The size, type and class of pipe being known, and the specific resistance being obtained from tables prepared for this purpose, the current in the pipe could be calculated with a sufficient degree of accuracy for work of this kind. If it were desired to repeat readings after the excavations were filled, permanent contacts were made by sawing a slot in the pipe, about 1/16-inch deep, with a hack-saw and riveting the end of a No. 16 rubber covered wire into the slot, the other end being brought to the surface for connection to the milli-voltmeter when desired. The junction between the copper and iron should be carefully covered with paraffine, pitch or other insulating material to protect the junction from corrosion.

Wherever practicable the current measurements were made in cities where one pipe system only, either water or gas, was provided with insulating joints, and by selecting places where the pipes of the two systems lay parallel and near together for some distance it was possible to obtain points at which the 2 systems were subjected to similar conditions, except for the insulating joints, and in this way a fairly definite idea of the effect of insulating joints could be obtained. Such readings are, of course, not altogether satisfactory, for there was often a difference in the material of the pipe, and in some cases a difference in size, and allowance should be made for these. There was also the uncertainty in regard to the ramifications of the network to which the lines were connected, but in general the conditions were sufficiently similar to indicate clearly the effect of the joints.

A number of these current readings in parallel mains are shown in Table IV. In test No. 1, made in Wilkinsburg, the measurements were taken on the 8 inch water main, provided with an isolated leadite joint, and on the same street measurements were taken on a 6-inch gas main provided with lead joints throughout. As shown in the table here, the current in the for mer was 0.6 ampere and in the latter 1.37 amperes, showing appreciable reduction, although the difference is small. It is important to note, however, that in this case the leadite joints were at a considerable distance apart, averaging several thousand feet; and, further, they were not installed with the idea of making them insulating so that in many cases the joints were of low resistance, owing to contact between the bell and spigot ends of the pipes. In test No. 2 measurements were taken on a 12-inch main provided with a leadite joint every 12 feet, and on a parallel 16 inch main with lead joints throughout. The difference here is very marked, the current in the lead jointed line being over 80 times that in the line having leadite in every joint. Similarly in test No. 3, where also one line was provided with a leadite joint every 12 feet, the difference is even more marked, the current in the case of lead joints being about 120 times that in the pipes having leadite joints. In test No. 4 the difference is much less, partly due, no doubt, to the difference in size of the pipes as shown by the table. The chief factor, however, is the distance between the leadite joints, this being in the present instance about 300 feet.

Tests Nos. 5 to 11, inclusive, were made in Erie, Pa., on wrought iron gas mains, provided with Dresser couplings at irregular intervals, and on parallel cast iron water mains provided with lead joints. In comparing these figures it should be borne in mind that cast iron

(*Continued on page* 26.)

THE AMERICAN GAS LIGHT JOURNAL

Entered at the Post Office, New York City, as Second-Class Matter.

Published weekly at 42 Pine Street, New York City.

Telephone Call, John, 2996. Cable, Am-Gas.

A. M. CALLENDER & CO., - - Proprietors.

THOMAS J. CUNNINGHAM, ELBERT P. CALLENDER, } Editors.
H. THURSTON OWENS, - Associate.

CHARLES H. WADELTON, Manager.

Agents—American News Co., 11 Park Place, New York City.
Lemcke & Buechner, Berlin, Germany.
Aug. Siegle, 30 Lime Street, London, England.

TERMS OF SUBSCRIPTION.

United States, Cuba and Mexico, $3 per year. Canada, $4 per year. All other countries, $5 per year.
Single Copies, 10 Cents.

NOTICE TO ADVERTISERS.

New Advertisements and changes of copy therefor should be in hand Wednesday noon of week prior to date of issue.

NEW YORK, MONDAY, JANUARY 8, 1912.

[Official Notice.]

New York Section, Illuminating Engineering Society.

Illuminating Engineering Society,
New York Section,
Office of the Secretary.

The January meeting of the New York Section, Illuminating Engineering Society, is to be held the 11th inst., in the Engineering Societies Building, 29 West 39th street, at 8 P.M. The meeting will be devoted to the subject of "Street Lighting," and there will be an illustrated lecture on "Modern Practice in Street Lighting with Especial Reference to New York City," by Mr. H. Thurston Owens. The lecture is to be followed by demonstrations and descriptions of several new types of street lamps, both gas and electric. Gas men, whether members or not, are cordially invited.

A. J. Marshall, Secretary.

[Official Notice.]

Annual Meeting, Indiana Gas Association.

Indiana Gas Association,
Office of the Secretary,
Indianapolis, Ind., Dec. 28, 1910.

The annual meeting of the Indiana Gas Association will be held in the Claypool Hotel, Indianapolis, on Wednesday, January 17th and Thursday, the 18th 1912. The sessions will begin promptly each day at 10 A.M.

The list of papers to be contributed and discussed is as follows:

Report of Progress on "The Relation of Heating Value to Candle Power in Commercial Water and Coal Gas," by Dr. A. B. Davis.

"Securing New Business and Increasing the Sale of Gas per Meter in Small Cities," by Mr. H. Kaufman.

"Calorimetry," with a short talk on "Surface Combustion," by Dr. S. W. Parr, Professor of Applied Chemistry of the University of Illinois.

"Artificial Gas in Natural Gas Territory," by Mr. T. A. Elder.

"The Value of Industrial Business and Means of Securing It," by Mr. G. W. McKee.

"The Natural Laws of Gases," by Dr. A. B. Davis.

"Reminiscences of the Early Days of Gas Business in Indiana," by Mr. I. W. Wallace.

The Executive Committee has arranged for an informal dinner, on Wednesday evening, the 17th inst., at 6 P.M., the purpose of the dinner to be social and convivial enjoyment and exchange of ideas among the members of the Association.

For the information of the manufacturers, we may say there will be no exhibit of gas appliances at this "convention."

Respectfully, Philmer Eves, Sec'y.

[Official Notice.]

Forty-Second Meeting, New England Association of Gas Engineers.

New England Association of Gas Engineers,
Office of the Secretary,
East Boston, Mass., Jan. 1, 1912.

The Forty-Second Annual Meeting of the New England Association of Gas Engineers, will be held Wednesday and Thursday, February 14th and 15th, 1912, at Young's Hotel, Boston.

Papers are being prepared on:

High Pressure Distribution.
Gas Office Buildings.
Industrial Appliances.
Producer Practice in Water Gas Making.
Shavings Scrubbers.
Measurement of Flow in Mains.

And on other subjects of interest.

Members will dine together Wednesday evening.

Those who wish to join the Association should send in application to the Secretary before the meeting. N. W. Gifford, Secretary.

BRIEFLY TOLD.

Annual Meeting, Illuminating Engineering Society.—The Sixth Annual Meeting of the Illuminating Engineering Society will be held in the "Machinery Club," 50 Church street, New York city, at about 8 o'clock, on the evening of Friday, January 12th. It will be preceded by a dinner served at the same place, beginning at 6:30, for which $2 a plate is charged. At this meeting there will be addresses by retiring President Kennelly, and by the presidents and other executives of various technical societies. The results of the annual election will be announced and the new President of the Society will be inducted. Registrations for the dinner should be directed to Mr. C. A. Littlefield, care The New York Edison Company, 55 Duane street, New York, N. Y., and should be accompanied by check for $2.

American Society of Mechanical Engineers—The Secretary of the American Society of Mechanical Engineers announces that a "get-together" meeting of the members residing in and near New York, will be held at 8 P.M. to-morrow, in the Engineering Societies Building, 29 West 39th street. The tentative programme includes a presentation of the "Recent Activities of the Council and What They Effect," by President Humphreys. The other topics, all of which are incident to the Society's domestic economics, are:

"Activities of the Committee on Membership," by Mr. E. C. Lucke.
"Some Problems before the Local Committee," by Mr. F. A. Waldron.
"Finances of the Society," by Mr. R. M. Dixon.
"The Problem of Membership," by Mr. Geo. J. Foran.
"Publications," by Mr. F. R. Low.
"The Library," by Mr. Leonard Waldo.
"The Business of the House Committee," by Mr. E. Van Winkle.

A cordial invitatiion to be present is extended to all.

December Meeting, Boston Section, N. C. G. A.—The December meeting of the Boston Section, National Commercial Gas Association, was held at Wesleyan Hall, 36 Bromfield street, Boston, Wednesday evening, December 27th, President W. B. Nichols directing. At this meeting the name of the Section was changed from "Boston" to "New England" Section; also, the date of annual meeting from September to October. The first of a series of monthly lectures for the ensuing year was given by Mr. R. F. Pierce, Illuminating Engineer of the Welsbach Company, Gloucester, N. J., his subject being "The Inverted Gas Mantle Light and Its Possibilities." Mr. Pierce stated that the full measure of success of gas lighting now depended largely on the solicitor aiming for first-class installations. Careful attention should be given to the placing of lights. The paper led to a spirited discussion. The next speaker was Mr. A. C. Witte, of the Haverhill (Mass.) Gas Light Company, who gave a very interesting talk on "Factory Lighting," illustrated by stereopticon views of recent gas installations in the shoe factories at Haverhill. Mr. Witte has been very successful in this matter of factory lighting, having recently completed some very large installations. Extended discussion followed the reading of this paper. About 75 members were present, and they represented all sections of the State. The present officers are working hard to make this year successful, and to that end have arranged a very interesting programme for the twelvemonth. At the next meeting (Friday, January 26th) Mr. J. P. Conroy, of the General Gas Light Company, New York, will lecture on "The Gas Arc Lamp and Its Possibilities." He certainly is well posted on the subject. For information respecting this meeting we are indebted to the attention of Secretary C. J. Connell.

ANNUAL CONVENTION, H. M. BYLLESBY & CO.—The annual convention of Messrs. H. M. Byllesby & Company with its affiliated utility companies, which was convened in Chicago the morning of the 2d inst., marked the tenth anniversary of the organization. When Chairman T. K. Jackson (Mobile, Ala.), called the convention to order 255 delegates were present, representing 40 groups of electric, gas and street railway properties in 18 States of the West and South. Many prominent men, outside the organization, were present as guests, and amongst them were Messrs. Thomas A. Edison; President C. A. Coffin, of the General Electric Company; President E. M. Herr, of the Westinghouse Electric and Manufacturing Company; President John F. Gilchrist and Secretary T. C. Martin, of the National Electric Light Association; and Messrs. J. B. Forgan, George M. Reynolds and Charles G. Dawes. The presence of Thomas A. Edison, who seldom attends public gatherings, was considered one of the greatest compliments which could be paid to the Byllesby organization. It came about through the fact that Henry M. Byllesby was one of Mr. Edison's assistants in the pioneer days of electrical development. Although the two parted business association years ago they continued their friendship. Following an address of welcome by Mr. Byllesby, in which he summarized the remarkable growth of the organization, and reiterated his belief that successful utility operation must rest upon clean, liberal and progressive management, the delegates proceeded to a programme of papers, discussions and addresses which lasted 4 days. This year the programme was devoted largely to questions affecting points of contact with the public, quality of service, regulation by State commissions and the efficiency and welfare of employees. There were only two strictly technical papers, and amongst those outside the Company who joined in the debate were Messrs. George B. Caldwell, Jno. F. Gilchrist, Samuel Insull and B. E. Sunny, of Chicago; and J. R. McKee and T. C. Martin, of New York. On the evening of the third, Mr. and Mrs. Byllesby received the delegates and their wives at the Byllesby house, 4358 Drexel Boulevard. The conventiou closed with a banquet on Friday night, which was greatly enjoyed. The convention programme was as follows:

"Staff Co-operation Toward Better Relations and Increased Efficiency of Employees," by Mr. W. R. Molinard, Oklahoma City, Okla.; "Points of Contact with the Public," by Mr. W. H. Hodge, Chicago; "Present Day Jurisdiction of State and Municipal Bodies Over Public Service Corporations," by Mr. Isaac Milkewitch, Chicago; "Steam Heating Economics," by Mr. A. E. Stevens, Minot, N. D.; "Suburban Distribution of High Pressure Gas," by Mr. H. H. Jones, of San Diego, Cal.: "Ways and Means of Building Up Business in Small Towns," by Mr. H. E. Morton, Albany, Ore.; "The Accountant in Public Service," by Mr. B. W. Lynch, Bluefield, W. Va.; "Our Appraisal Work During 1911," by Mr. Harold Almert, Chicago; address by General Geo. H. Harries, President, Louisville (Ky.) Gas Company; an illustrated lecture on "Engineering," by Mr. O. E Osthoff, Chicago; an illustrated lecture on "New Business Methods," by Mr. E. L. Callahan, Chicago; "The Attitude of the Manager Toward His New Business Department," by Mr. Alex. F. Douglas, Portland, Ore.; "The Byllesby Employee's Investment Club," by Mr. R. J. Graf, Chicago. The topics that will interest gas men greatly were those treated by Messrs. Jones, O. E. Osthoff, E. L. Callahan and Gen. Harries. The latter gentleman will surely become *persona grata* in the gas business.

CURRENT MENTION—

MR. JOHN J. SCOTT, son of the late Mr. Wm. M. Scott, has succeeded his father as Superintendent of the Lewiston (Me.) Gas Company. It is worthy of note that the first Superintendent of the Company was Mr. John Scott, grandfather of the present incumbent. Mr. Wm. R. Stevens, who has been connected with the Company in various office positions since 1886, has been selected Secretary of the Company.

MR. BENJAMIN BACON, for 30 years Treasurer of the Newton and Watertown (Mass.) Gas Light Company, died at his home in Newton the 29th ult. He was virtually 84 years of age, having been born in Newton, January 2, 1828. Deceased acquired his education in the local schools and in the Framingham Academy. Graduating from the latter, he entered the service of the Newton National Bank, and attained the position of Cashier therein, serving as such for a lengthy period. On his retirement from that position (1910) he was elected Vice-President of the institution. He was a man of refined ways and kindly impulses, simplicity marking his habits, and is survived by two sons. The funeral services were held in his late home, the after noon of the 2d inst., the Reverend H. Grant Person (pastor of the Eliot Congregational Church, of which he had been an active member), assisted by the Reverend Walcott Calkins, a former pastor of the Eliot congregation. Interment was made in the Newton Cemetery.

THE Oliver Continuous Filter Company, which device is being largely used in the gas works of the Pacific Coast, has moved into larger headquarters, rooms 704 to 707 in the Hooker-Lent building, Market and Bush streets, San Francisco. The field engineer of the Company (Mr. R. Gordon Walker) and Mr. W. W. Merriam (its Mexican representative), and the other members of its engineering and commercial staff, ask us to state that the Company will be well pleased to have any of the gas men who happen in San Francisco make their headquarters in the premises, No. 533 Market street.

MR. E. K. LESSZARDER, Secretary of the Reliance Gas Regulator and Machine Company, informs us that his Company has purchased the plant and other equipment of the Reliance Machine Works, of Pasadena, Cal., also the patents, rights and sales' agencies of the Reliance Engineering and Manufacturing Company, of Chicago, and have incorporated in California for $100,000 fully paid up capital. This Company has just completed its new plant, construction of concrete and iron, consisting of machine shop, 80 feet by 185 feet; foundry, 80 feet by 185 feet; and pattern shop, 40 feet by 60 feet, with the necessary trackage and spurs, to facilitate shipments to all parts of the country. The Company's chief productions are the "Reliance" high and low pressure gas regulators, district governors and gas clamps, together with automatic and special machinery and high grade castings of every description. He adds that the outlook for business is particularly promising, and that the Company has established branches in Los Angeles, Seattle, Chicago and New York. The general offices are in Pasadena, Cal.

THE Wisconsin Public Utilities Commission has issued a formal order declaring that $50,000 is the sum fixed as the purchase price to be paid by the city for the taking over of the properties, for operation on municipal account, of the Kaukauna (Wis.) Gas, Electric Light and Power Company.

BEGINNING the first of the year, all employees of the Boston (Mass.) Consolidated Gas Company, whose duties take them into the houses of customers, will be clad in a distinctive uniform. Some of the men have raised objections to the procedure, declaring that the plan was mainly another effort on the part of the Company "To secure more cheap advertising." Could anything be weaker than that objection!

WE understand that the negotiations making to the sale of the street railway between Ishpeming and Negaunee, Mich.) and the Ishpeming gas and electric lighting plants have been sold by the Farwell-Granger Company, of Chicago, to the L. E. Myers Company, of Chicago.

THE City Council of Dinuba, Cal., has voted to appoint a commission to determine the cost of constructing a gas plant to be operated on municipal account. The place named, which has a population of 5,000, is growing rapidly.

MR. CARL NATION, local manager of the Emporia (Kas.) Gas Company, is about ready to receive bids for the work of putting in an artificial gas plant in that city. Natural gas in that section may no longer be relied on.

MR. HOMER KEYES has resigned the position of Assistant Manager to the Sacramento (Cal.) Natural Gas Company. Mr. H. C. Keyes, father of the former, will continue to manage the Company's affairs.

MR. C. L. BAILEY, whose resignation as Superintendent of the Waynesboro (Pa.) Gas Company became effective the 1st prox., will occupy a responsible place on the force of the New York Traction Company.

"W. W. T.," writing under date of the 2d inst., forwards the following from Nashville, Tenn.:

"At 12 o'clock, December 24th, Mr. J. F. Stacey, General Manager of the Nashville (Tenn.) Gas Company, was presented with a handsome gold watch by the office employees. Mr. Stacey entered the service of the Company in 1882, and by diligent and able management, worked up to his present position. He is the oldest man in the service, in point of time, and has held about every position the Company has in its gift. The employees marched up to the Manager's desk as the clock was striking noon hour, and A. A. Dobbs, in his capacity as spokesman, made the following presentation speech:

"Mr. Stacey, you have been the 'boss' around here a long time, but now I have assumed authority, and my first order is that you sit up and take notice. My associates in the office and store honored me when they selected me to speak for them on this occasion, and on behalf of all your employees I want to congratulate you, as General Manager of the Nashville Gas Company, upon the most excellent showing you have made. For you personally, Mr. Stacey, we all have the kindliest feeling of warm personal friendship. We realize that you have been our friend, and as an evidence of our high regard and esteem for you, we desire to tender you this solid gold, 23 jewel Elgin watch. We have all worked together here for a number of years, some for more, some for less, but we cannot hope to remain together always, but, no matter where you or we may be, we hope that when you have occasion to refer to this time-piece it may call you back to the happy days we spent together at the office of the Nashville Gas Company. We now wish you a merry Christmas and a happy New Year."

The gift came quite unexpectedly to Mr. Stacey, and so surprised was he that for a while he was unable to shape his thanks in the form of words.

(Continued from page 23.)

TABLE IV.—*Currents Flow in Parallel Mains.*

City.	Mains Type.	Mains Class	Mains Size Ins	Type of Joint.	Distribution of Insulating Joints in Mains.	Section in which Drop was Measured: Distance to Joint.	Section in which Drop was Measured: Length Feet.	Average Potential Across Section Millivolts.	Amp. in Pipe.
1. Wilkinsburg	Cast	D	8	Leadite	Insolat.	Adj.	9	0.2	0.6
Wilkinsburg	Cast	A	6	Lead	None.		6	0.4	1.37
2. Wilkinsburg	Cast	A	12	Leadite	12 ft.	Adj.	11½	0.013	0.65
Wilkinsburg	Cast	C	16	Lead	None.		6	0.2	5.55
3. Wilkinsburg	Cast	D	12	Leadite	12 ft.	Adj.	10½	0.013	0.72
Wilkinsburg	Cast	C	16	Lead	None.		8	0.83	8.66
4. Wilkinsburg	Cast	D	12	Leadite	300 ft.	Adj.	11	0.02	0.106
Wilkinsburg	Cast	C	4	Lead	None.		6	0.3	0.695
5. Erie	Wrot.	Stan.	6	No. 6 D	Insolat.	Adj.	3	0.005	0.167
Erie	Cast	C	6	Lead	None.		3½	0.8	4.6
6. Erie	Wrot.	Stan.	4	No. 6 D	Irreg.	Adj.	3½	0.01	0.26
Erie	Cast	C	4	Lead	None.		10½	8.0	12.8
7. Erie	Wrot.	Stan.	6	No. 6 D	Irreg.	Adj.	3	0.0025	0.086
Erie	Cast	C	20	Lead	None.		10½	1.9	22.6
8. Erie	Wrot.	Stan.	4	No. 6 D	Irreg.	Adj.	2½	0.01	0.236
Erie	Cast	C	4	Lead	None.		7	0.15	0.3
9. Erie	Wrot.	Stan.	6	No. 6 D	Irreg.	Adj.	1½	<0.0025	<0.196
Erie	Cast	C	6	Lead	None.		11½	0.02	0.75
10. Erie	Wrot.	Stan.	8	No. 6 D	Irreg.	Adj.	2½	<0.0025	<0.156
Erie	Cast	C	6	Lead	None.		11¾	2.4	4.4
11. Erie	Wrot.	Stan.	3	No. 39 D	20 ft.	Adj.	22	0.005	0.108
Erie	Cast	C	6	Lead	None.		10½	2.0	3.9
12. Ashtabula	Wrot.	Stan.	3	No. 6 D	Irreg.	1,000	10	1.2	<0.0125
Ashtabula	Cast	C	10	Lead	None.		10	0.3	1.29
13. Ashtabula	Wrot.	Stan.	3	No. 6 D	Irreg.	1,300	4	—0.01	—0.104
Ashtabula	Cast	C	12	Lead	None.		10	0.5	2.91
Ashtabula	Cast	C	12	Lead	None.		10	0.2	1.16
14. Ashtabula	Wrot.	Stan.	3	No. 6 D	Irreg.	500	10	0.015	0.62
Ashtabula	Cast	C	10	Lead	None.		10	5.0	21.5

has a much higher resistance than wrought iron, and further that the lead joints themselves introduce considerable resistance into the circuit, so that the real effect of the Dresser joints is much greater than the figures would indicate. While considerable variation exists in the ratios of current in parallel mains in the different tests of this series, they show without exception considerable reduction in current due to the insulating joints. Taking the average of the 6 tests of this series we find that the current in the lines having lead joints averaged about 58 times that in the lines having insulating joints. In all of these cases, except in test No. 11, the insulating joints were irregularly spaced the distance between joints in various parts of the system varying from 300 to several thousand feet. This fact being considered, the reletively low values of current in the lines provided with insulating joints is quite remarkable. In the last three tests, shown in Table IV., Nos. 12, 13 and 14, the ratios of current in the lead jointed lines to that in the lines with insulating joints is respectively 103, 28, and 346; but in these tests considerable allowance must be made for the relatively large size of the cast iron mains, as shown by the table. A remarkable feature of test No. 13 was that the direction of flow of current in the gas line having insulating juints was opposite to that in the lead joint line. This is due, no doubt, to the fact that the gas main was discharging current into the water network occupying the same district, as an insulated one may give rise to abnormal local conditions which may tend to cause trouble to the insulated line.

(To be Continued.)

[CONTINUED FROM PAGE 12.]

PROCEEDINGS, SEVENTH ANNUAL CONVENTION, NATIONAL COMMERCIAL GAS ASSOCIATION.

HELD IN DENVER, COL., OCTOBER 24 TO 28, 1911.

THIRD DAY—AFTERNOON SESSION.

The President announced that, according to the understanding prior to adjournment, they would discuss the paper prepared by Mr. Jones. He called on Mr. Loebell to open it.

Mr. Loebell said that Mr. Jones explained the conditions of the accounting department by remarking that the members thereof should have close relations with the heads of all departments, as he believed there was very close relation between the accounting and commercial departments, and if the latter did not get the co-operation of the former the commercial department was badly handicapped. As an illustration, every gas company in the United States had to contend with alleged high bills, so-called. Hence, if they had the co-operation of the accounting department the bills went through the hands of the commercial department then went out to the consumers. He imagined some accounting departments might object, in that it caused harder work, so he would like to hear from others how they handled it, and to what extent the accounting and commercial departments co-operated.

Mr. Turrentine said the accounting department in any gas company was a most important feature of the business, for when an incorrect bill was sent out the impression was created that incompetent bookkeepers were employed, moreover the person who used over 10,000 cubic feet and got a bill for 7,000, which bill should have been 17,000, would pay for the lesser amount, never saying a word as to how small the bill was that month. Their experience in Houston, Tex., had been in the last few years with that class of bills (say those underread one month and corrected the next) that the consumer, when the bill was presented would pay it, never saying a word as to how small it was. Next month though, when the bill for the undercharge was in evidence, it would require some mighty clever talking to collect it. The worst thing, however, was the impression caused, that the bills were not rendered correctly. The most important work in a clerical department was the billing system. They endeavored to get competent meter readers and capable accountants. His company's bookkeepers entered the amount on the consumer's ledger, another made out the bill from the meter card turned in, and both were compared. He believed they never had an error on a bill thus checked up. If one made an error of say 1,000 cubic feet, the other had entered it correctly on the bill or ledger, so it was caught before going out. When bills were sent absolutely correct no trouble would be experienced in collecting them; best of all, there resulted a good impression among the people, who would often say, "The gas company is one concern that sends out its bills absolutely correct." [Applause.]

Mr. Day declared that Mr. Jones had given them an excellent paper. He was very glad it had been written, for in the different conventions one rarely listened to an office paper. He failed to understand why, but it seemed gas companies were now devoting more time to the accounting end of the business. Mr. Jones referred to the co-operation of employees, which, while generally necessary, was in the accounting end probably more closely allied to the general business of a company than any other department, since everything in greater or less degree came before it. Mr. Jones had divided the paper into two sections; first, as to the efficiency of office employees. It was as necessary that office men should be trained as it was to train men in any other branch of the work. Take, for instance, the complaint men in these later days; they were calling them information clerks, but he believed they could drive away more business than any commercial department could keep on the books if not of the right sort. It had been often said that an office man was practically a figurehead; in other words, a machine; but he believed that when companies devoted more time and attention to that end of the work they would have gained the point for which all were working—efficiency as well as economy in operation. [Applause.]

Mr. Daily thought the key-note of the system of efficient accounting was as Mr. Jones partially brought out, the selection of their men. With a vacancy in the complaint department and another in the consumers' bookkeeping departments, suppose one applicant is a jolly, genial, good-natured sort of man, of good appearance and a good talker, but rather careless as to detail work. Putting him on the books will cause you to get a poor bookkeeper, but lose a good complaint man. To the contrary, if a man careful of detail, with natural ability for figures, and with initiative, is put at the complaint window you have a poor complaint man, but lose a good bookkeeper. The whole thing depended on the selection of the men. He did not care how efficient the system might be, or how advanced, unless they selected a man suitable for the position, they got poor results.

The President asked Mr. Gardiner to close to the discussion.

Mr. Gardiner thought if one had opportunity, for instance, such as he had, having some 30 operating reports pass before him every month, to note the performances of a large group of different departments in different companies, the impressive thing would perhaps be the absolute necessity of making every man in the company, who had to do with that eventually summarized in a monthly report, realize just exactly how far he fitted into its columns. They had reports coming perfect in form, but containing figures that seemed abnormal. Following back by correspondence one would find, for instance, the coal area was 1,400 pounds, while the report showed it was only getting 1,375 pounds per filling. The explanation is that the coal gang being a little short on weights, threw the whole yield balance out. It appeared in the coal cost per retort per 1,000. They should act carefully in raising the efficiency of their accounting systems, and when that was done they would find that, all through the further clerical steps, the thing would be run more correctly, and that everybody would be doing his work understandingly, knowing just where he fitted into the ensemble, with a realization of responsibility. Just as soon as a man got to realize his responsibility to the work as a whole, and to his fellow workers, then he began to get really efficient, and forge on ahead as a man in his human capacity, which stage in turn is reflected on his work, and they had the efficiency of the whole machine raised in the aggregate by raising the efficiency of an individual unit. He thought that was the general idea Mr. Jones wished to bring to their attention. He thought if each on his return, not meaning necessarily to reorganize their accounting departments, would just ponder over the way of routine, to see whether their hindsight was not a little better than their foresight, would not regret the time given to such pondering.

The President called on Mr. J. H. Walker, of Milwaukee, Wis., who read the following paper on the

VENTILATION OF FUEL GAS APPLIANCES.

Mr. Walker prefaced the reading by remarking:

I never believed it necessary to make an apology for what a man was going to do, as I have heard from a great many; but, in this case, while I do not apologize for the paper, I wish to call your attention to the fact that when I was asked to write this paper I was asked if I would kindly hand it in within 10 days. I was away from home 5 days of that time, and took about 6 days more, and this is the result. I did not have time to carry out experiments of any kind, so as to give you any figures or data in regard to it, but simply wrote it as plainly as I could, with the single purpose in view of bringing up a discussion. There are others here who can ventilate the subject better than I can.

The necessity for ventilation of fuel gas appliances, when applied to domestic ranges, water heaters, and other gas apparatus used in households, has, in the past, been a subject which has developed considerable controversy between appliance manufacturer, dealers and and gas companies.

Gas engineers, as a rule, admit the necessity, but commercial interests, represented by agents and solicitors, are following the line of least resistance in the solicitation of business, have very often found that insisting upon a flue connection, with the cost of same added to the appliance, was a barrier to the sale, and the suggestion that it was desirable, but not a necessity, furnished an easier way to the completion of the sale than to insist upon the installation. This condition has been almost invariably accepted by the gas company, rather than open a controversy with the consumer and allow an opportunity for a countermand of the order.

As most of the household appliance sales are made in the spring or early summer, when doors and windows are open during the cooking hours, the ventilation has taken care of itself, and the lack of a flue connection was not noticeable to any great degree, but, as soon as the weather become unfavorable for these conditions, the existence of bad or no ventilation had an appreciable effect on the physical condition of the operator, which in many cases would be attributed to a slight disturbance of general health and not to the real cause. A continuation of these ailments and a noticeable change in the operation of the burners, especially in the oven, would bring a complaint to the gas company that the appliance was not giving as good results as when first installed, that the odor from the gas was disagreeable, and that the oven did not bake as it did during the summer months.

The complaint man, in 9 cases out of 10, would lay the blame on almost anything except bad ventilation, would remedy some trivial defect in the regulation of air shutter or orifice, would trust to luck that it would be "all right to-morrow," would return a report that "There was nothing wrong," and leave an impression that the consumer had registered an uncalled for complaint.

I thoroughly believe that any gas company will find. by analyzing the work of the complaint department, as far as domestic appliances are concerned, that a large increase in complaints is registered at the opening of the fall and winter season, and that many complaints, which seem trivial and uncalled for, would be eliminated if due attention were given to proper ventilation.

The results of improper ventilation are quite noticeable by the odor of unconsumed gas, due to the fact that the products of combustion remain too long in proximity of the flame, causing what is commonly termed "floating," more especially noticeable in the oven burners on account of their being enclosed in a small space, the oven flues being in many cases none too large, even with the accelerated draft.

Other direct evidence of lack of proper ventilation is the presence of grease and soot on the walls, and, worse than all, a languid condition of the operator and a disinclination to partake of the meal that has been prepared.

The desirability of an all-year gas kitchen, for increasing the domestic consumption, is an unquestioned fact, and the delay in attaining that result is, I believe, due to improper installation of appliances with regard to the removal of the products of combustion, fully as much as to the many excuses given by consumers for discontinuing the use of gas during the winter months. The public desires to use gas for the many advantages it offers, but the precedent set by many gas companies, in not insisting on proper flue pipe connections on all apparatus, has brought about the condition named above, and these have been a poor (but lasting) advertisement of gas appliances.

The would be wit "builded better than he knew" when he said the three most reliable vehicles for the dissemination of information were "telegraph, telephone and tell-a-woman." It devolved upon the gas company to see that the information disseminated by the latter is *good advertising*, as it is the woman of the house upon whom the gas company depends for its income from domestic appliances.

I have perhaps dwelt too long on the domestic department, and the benefits to consumer and company of proper ventilation of gas appliances apply equally to all departments of the house, but affect the greatest number of lives in the domestic department, lives which are naturally more susceptible to the effects of improper ventilation.

The proper ventilation of industrial gas appliances is a foregone conclusion, made absolute by the greater quantity of gas consumed, not only for the effect it may have upon the health of the workman, but upon the proper combustion of the gas. In operations where high temperatures are to be maintained, the combustion chambers are often necessarily limited in space, and as a large quantity of gas must be taken care of in a limited area, one may readily see the necessity of removing the products of combustion the instant they are formed, if we are to maintain the efficiency of the flame.

The lack of proper and rapid ventilation and too limited area of combustion chambers have as often lowered the efficiency of a gas appliance as the lack of insulation or faulty workmanship.

The great value of proper ventilation was most thoroughly impressed on my mind during experiments conducted in the past year which resulted in successfully placing upon the market a new type of commercial gas range, constructed without any burners directly under the top, the *flames only* being allowed to occupy the combustion chamber.

By a proper flue connection, I am enabled to obtain a flame issuing from a ¾-inch opening, of a specially constructed burner, from 18 to 24 inches long, consuming 18 cubic feet per hour, maintaining its integrity for its full length with a high efficiency, and without the use of applied power as in so-called blast burners. The flame being

horizontal, I maintain that the high efficiency produced and the extremely favorable results as compared with the best quality of hard coal are largely due and depend to a great extent on the prompt removal of the products of combustion. That high efficiency is attained is unquestionable, as the results of about 25 different installations of the range warrant now the statement to prospective customers that gas at 80 cents per 1,000 cubic feet is cheaper than anthracite coal at $7 per ton. To accomplish this we insist on proper ventilation.

The results of a great many experiments with many varieties of fuel gas appliances have fully convinced me that the subject of this paper furnishes food for thought of vital importance in the extension of the gas interests, and should receive the earnest attention it deserves both for the benefit of the consumer and the gas company.

In view of the fact that the regulation of public utilities at the present time is a subject uppermost in the minds of the public, it behooves us to remember that, if we are to reap the benefits of increased income, we must give the public the best we have, keep them in a proper frame of mind, and forestall any criticisms as to our methods of doing business. It is proper at the present time to mention the fact that a law looking to the proper protection of the working man in the State of Illinois, which, although not directed especially at the gas companies, bears directly on the subject of this paper, in that it provides under heavy penalty that the employer must provide proper ventilation for all classes of apparatus which in operation give off noxious fumes or gases. This simply shows that the subject must not be passed over lightly. It is easier to forestall conditions than to be compelled to act. I trust the members present will take up this paper and *ventilate* it thoroughly.

Discussion.

The President called for discussion on Mr. Walker's paper.

Mr. Smith said he fully concurred with Mr. Walker on the vast importance to the gas business in general of the subject of ventilation. At every convention they had (he belived he had attended all of them) taken up this subject, and if the speaker were to offer any criticism at all on Mr. Walker's paper, it was that Mr. Walker did not tell them how to overcome or eliminate troubles of ventilation. These troubles, from an engineering standpoint, made a very deep subject, and one, as Mr. Walker stated, that should be taken up for deep considering. Later in the discussion he hoped Mr. Walker's paper would try to bring out some points that would aid them in that particular line of work to overcome the unfortunately poor system of ventilation of the present time. In an installation he had in mind now, which was made by a very large gas company, the latter sold a No. 8 instantaneous heater to an Engineers' Club, composed of men not so-called engineers; men who were brought up in the engineering art and knew it thoroughly. The heater was installed in this Engineers' Club and it had ventilation through a proper flue, so the gas company's engineering department declared. The conditions in the building where it was placed were very disadvantageous as to proper ventilation. What was done was this. A flue pipe was run up to the level of the building, say 2 feet above the roof, with the consequence that a back draft was formed, because larger buildings sur rounded it. The back draft blew out the pilot light, somebody drawing water let the gas accumulate in the No. 8 heater. The man running it lighted the pilot flame, and the result was loss of life and the complete destruction of the heater. The engineers, who were the best in the world to advocate this heater, immediately said, "Nothing doing for that; that thing must be taken out;" but the very good gas men in that company insisted on having another chance. They increased the length of the flue pipe 8 feet this time. The engineer of the company got on the job himself, and added 6 feet more to the pipe. Again, the instantaneous heater exploded, this time with less serious damage. They could imagine what that one installation meant to the gas industry at large and the manufacturers of the water heater. It was only necessary to extend that flue 12 to 16 feet to offset the atmospheric conditions that the heater had to buck up against on account of tall buildings in the neighborhood. It was simply an engineering proposition, yet it did not seem that any gas man realized it. The speaker said he could make it work. He had to go first to the company and make them a promise; but he took the big chance. He ran the flue 18 feet above, and that heater was working satisfactorily to day, although the engineers are not quite sure it is safe, but are not quite so afraid of it as they were. In Coney Island, (I mention that place for probably in no other place in the world are so many people fed on a holiday or Sunday as there) where perhaps 500,000 people are fed in 24 hours, there are more eating places, big ranges, water heaters, etc., in that limited space than probably in any other equal space he knew of in the world. Going there one cannot fail to see great numbers of smoke stacks, from 18 to 30 feet up in the air. Plumbers and architects, in fact everybody else in the construction line, seem to have a better knowledge of ventilatian than the gas man. It was a source of mystery to him to determine why they had never taken the time to go into it more thoroughly. Mr. Walker notes the dangers of no ventilation at all, and he would say, from an experience of 11 years, that poor ventilation was much worse than none. A mere ventilating pipe in a kitchen range did not mean anything, as far as taking off the fumes and eliminating odors went, unless accompanied by the proper hood or stack. As far as concerned the dangers of fumes from gas in domestic use he would say, for the benefit of the salesmen who sold these appliances, they need not take that too greatly to heart. One manufacturing concern in Jersey City, N. J., was second to none in the world, save a cyanide hardening plant in Detroit, had a cyanide hardening plant, with down-forced gas furnace, the fumes being the most deadly in the world. Yet he knew a man who had been working over the furnaces for the past 30 years and was still a very healthy specimen of humanity. He did not wish their salesmen to get the erroneous idea that every gas range or water heater had to have a flue connection, for a great many sales would be lost if that were kept in mind; but he would far rather have no flue connection than a poor one, for the reason that a down draft through the pipe, due to conditions they were against in the atmospheric changes, and which were bound to exist, had a tendency to work against the complete combustion of gas, and which was worse than to have no flue pipe at all. Unless they could get some person to write a paper, or unless Mr. Walker would to-day show them the proper way to ventilate their appliances, he did not think they had accomplished much as yet.

Mr. Cohn wished to say a word of protest against the sweeping statements that had been made regarding "noxious fumes" of gas. It was regrettable that such unqualified statements should be made, for they all knew that in the perfect combustion of gas there were no noxious fumes whatever. In practice, they found in Baltimore, where perhaps 60,000 or 70,000 gas ranges without flue connections were used in the homes of the people, there had been no trouble whatever.

Mr. Rushin asked whether circulating water heaters in Baltimore were installed without flue connections.

Mr. Cohn replied they had connected in Baitimore about 15,000 small circulating water heaters without flue connections.

Mr. Loebell said the ventilation problem was surely a very important one, and he believed there were as many ideas respecting ventilation as there were gas men in the United States. He believed Mr. Walker's point was well taken, that a gas range or any other gas appliance should have a flue, and he would have greatly appreciated a statement as to how the flue should be connected. There was no doubt in any of their minds, who have had to do with industrial fuel appliances, that a most efficient appliance could be made useless by means of a solid flue connection. Industrial fuel appliances must have high temperatures in order to operate properly. Of his knowledge, he did not know of many gas companies that put flue connections on domestic ranges. Personally, he agreed with Mr. Cohn that they were not obliged to have a flue, since no noxious gases were passed, if the gas burned properly or completely. He did take exception to the statement made on water heaters, for if the gas struck the coils containing the cold water, the products of combustion would sometimes contain a small quantity of carbon monoxide. All gases had to have a certain temperature in order to burn properly, and the temperature of ignition was sometimes lowered when the gases came in contact with the cold surface. Hence, many accidents happened where circulating water heaters, or instantaneous water heaters, or any other kind of water heater, had been connected in a living room without flues. To-day, in the city of Spokane, they had a lawsuit of some magnitude on account of an instantaneous water heater being connected without a flue. A year ago they had a case which would have resulted fatally had it not been for certain happenings of a fortunate nature. He absolutely favored putting flue pipes on all water heaters. but did not agree to putting flue pipes on gas ranges. He favored putting flue pipes on all industrial appliances where the operator was close to the appliance, but did not believe in having a solid flue. He believed in having a certain kind of hood having an opening in the room equal to the area of the flue pipe, which meant that the draft would never exceed the natural rise

of the flue gases, and when that moment was reached air would be drawn in from the room.

Mr. Walker called the attention of Messrs. Cohn and Loebell to the fact that the word noxious was used in quoting the terms of a law passed in Illinois, and did not refer to any other portion of the paper.

Mr. Eves agreed with Mr. Walker that they must have flue connections on all industrial appliances and on all water heaters as well wherever set. He did not think, however, that it was either necessary or advisable to have flue connections on cooking appliances, especially as to domestic gas ranges. And for two reasons: First, because the flue connection was, as a rule, faulty, no matter what one tried to do. There would be a down draft that would occasionally blow out the flame or set fire to the article being cooked, thus doing a great deal more harm than good. Second, they believed that flue connections materially interfered with the efficiency of baking in a gas range oven. The flue had a tendency to draw the heat to the rear of the range and the baking was then complained of as being uneven, to the disadvantage of the gas range, whereupon the gas companies were blamed. Perhaps Mrs. Carroll would be able to tell them it was neither necessary nor advisable to put on any flue connection, for the two reasons alone, and there were other reasons. In the two cities in which he had been engaged putting out gas ranges (a total of something like 60,000 gas ranges) altogether, he had placed no flue connection, and they had no trouble. That seemed the experience of the members, and probably Mr. Walker, being an engineer engaged in putting these flue connections on industrial appliances, would modify his opinion regarding the domestic gas range.

Mr. Hanlan, in saying just a word before the discussion was closed, and in view of the fact that they had heard from men (other than Mr. Cohn) who favored the practice of connecting all gas appliances with flues. They did not connect water heaters, other than those automatic, instantaneous water heaters with flues, unless the consumer wished them to do so for some special reason. They had sold this year over 5,500. They did not connect ranges with flues unless it was the consumer's wish to have the range thus connected, and in all of his experience he had not found it necessary, as general practice, to connect the appliances with flues. Thousands of ranges and circulating water heaters were installed in this country not connected with flues, which appliances are in operation, giving good service, and, in the speaker's judgment, entirely safe. In his own home the range and water heater are not connected with a flue, and he had never heard of any of the members of his family speak of the slightest discomfort, which they certainly would, should such exist.

Mr. Hoy said this subject of flue connections on fuel appliances seemed to him so broad that they could spend an entire afternoon on the subject. It seemed from the discussion they were equally divided, many of them favoring using flue connections, while many were opposed. He wished to say, however, that in Chicago they made it a universal rule that every fuel burning appliance must be connected with a flue. [Applause.] They did not allow a circulating water heater nor an instantaneous water heater to be connected anywhere without a flue. [Applause.] As to the hotel and restaurant appliances with which he was more familiar than with the rest of the work, they often absolutely refused to sell the party because they were no flue facilities in the building in which he wished to place the stove. Various arrangements could be made whereby a flue connection might be secured by making an opening through the side of the wall, extending a galvanized pipe to the top of the house, there building a little hood over the top of this to prevent a draft, and that gave them a flue. Recently a baker's oven was installed in a building without a flue, and the arrangement he had just outlined was put in. The people refused to run the pipe to the top of the building; they had had trouble with a back draft. He gave them their ultimatum in regard to the case, and they are now prepared to extend the galvanized pipe to the top of the building, and all their troubles will then be over. In his opinion they believed it necessary to have a flue, to secure the proper working of the oven. Baking and roasting, as they knew, were simply a process of evaporation. Baking bread, for instance, was a process of evaporating about 2 ounces of water out of each loaf. Oftentimes without a flue the evaporation was not complete. The moisture would hold in the top, then settle back on the bread giving what is commonly called "white livered bread." A customer then claims the oven will not brown, but that is due to the condensation falling back on the bread. The law repassed was not affecting them, because they had been recognizing flue connection propositions. He wished to go on record in this meeting, as a representative of the Peoples Gas Light and Coke Company, of Chicago, that no gas burning appliances should be connected anywhere without a proper flue connection. [Applause.]

Secretary Stotz assumed the Chair and called on Mr. Walker to close the discussion.

Mr. Walker said he seemed to have one champion present, but he thought there were a great many more, if there were time for them to arise and say so. The value of proper ventilation of any piece of apparatus, no matter what the fuel, whether it be gas or anything else, had always been recognized since the days of Adam. It had always been known that it was necessary to carry away from it anything which was active, or anything where proper, pure air was required for the existence of the same. The necessity for flue connections in the kitchens, to the domestic ranges, was to his mind absolute. It seemed to have been proven so many times. They could not grow plants in their kitchens unless they had flue connections on their gas apparatus. Why do the plants die? The gases from the apparatus or from the appliance kill them. One cannot even do it in a sitting room, if there is a leak in the furnace pipe, with dry air. A canary bird kept in the kitchen would be killed by it, and while it may not kill your servant it will give her a severe headache. The important extension of the gas business with the public depends on giving the public the very best they could give them, and in these days where everthing is being inspected, with a view to trying to give the public the benefit of scientific knowledge of correct living, the problem of ventilation of houses seemed to have been laid aside for the present. They were inspecting and enforcing laws in regard to a great many things which were not of nearly as much vital importance as the subject in hand. One gentleman remarked that poor ventilation was worse than none at all, but he would not advocate poor ventilation under any circumstances; there was no necessity for it. It was either good ventilation or none. The reason for a great many faults with a gas range or with any other appliance, where connections had been made to the flue, was that, after the flue had been used for coal or wood for many years, it was in no condition to take care of the proper ventilation of the gas range. The gas company had to buy the pipe, but the dealer puts it up paying slight attention to where he puts it. The danger of a back draft on a gas appliance applies equally to a coal appliance. A back draft on your appliance is not the fault of the appliance, but rather of ventilation. Why not correct the defect, instead of taking down the pipe and letting it blow into the room? He had been asked, or it had been stated, that he should have told them how to correct this fault, but that was a matter which was up more to the engineers who made a study of proper ventilation. He did not claim to be a jack of all trades, but thought if the matter were taken up by engineers who had given the matter of ventilation thorough study, these could post the majority of gas men much better than the speaker could on that subject.

(To be Continued.)

Record Value in Clay Products.

"New Series," No. 31, of the U. S. Geological Survey, dealing with the products of the country for 1910, states:

The products of the clay-working industries in the United States—brick, tile, pottery, etc.—reached in 1910 the largest value ever attained, the total being $170,115,974, compared with $166,321,213 in 1909. These figures are presented by Jefferson Middleton, of the United States Geological Survey, in an advance chapter from "Mineral Resources" for 1910—"Clay-Working Industries."

In the brick and tile industry building brick of all kinds except fancy or ornamental declined in value, while drain tile, sewer pipe, architectural terra cotta, fireproofing, stove lining, and fire brick showed gains. In the pottery industry every item increased in 1910, except stoneware and yellow and Rockingham ware, which showed a loss of about $200,000.

The imports of pottery increased but little and the proportion of domestic production to consumption, 77 per cent., was the highest ever recorded. Some idea of the growth of the pottery industry may be obtained from the fact that as late as 1875 the domestic production was but 15 per cent. of the consumption. The exports of high grade domestic pottery in 1910 showed a small increase, but the value of exports of all clay products increased over 31 per cent. The increase in the price of common brick was one of the most noteworthy features of the industry in 1910, the most marked example of this being in Illinois, where the price advanced from $2.40 per thousand in 1909 to $5.62 in 1910. The decrease was 570,353,000 in the common brick pro-

duced, however, caused a loss in value in this class alone of $2,031,564. Every State and Territory, except Alaska and Hawaii, is a producer of burned clay.

The following are the 10 States with highest recorded production for 1910:

State.	Brick and Tile.	Pottery.
Ohio	$17,231,236	$14,294,712
Pennsylvania	19,814,355	2,279,930
New Jersey	9,245,854	8,588,455
Illinois	14,331,414	844,747
New York	9,778,288	2,093,661
Indiana	7,143,306	956,704
Missouri	7,058,705	29,061
Iowa	5,310,706	17,535
California	4,744,968	97,423
West Virginia	1,322,457	2,675,588

The rapid growth of the clay-working industries during the last 10 years forms an interesting study. The total value of these products increased from $110,211 587 in 1901 to $170,115,974 in 1910, a gain of 54 per cent. Fire brick attained its maximum value in 1910, with $18,111,474, nearly doubling that of 1901. Drain tile showed a steady gain throughout the 10 years and in 1910 reached a value of $10,389,822. Architectural terra cotta and fireproofing underwent but few depreciations in value during the period, and both reached their maximum in 1910, $6,976,771 and $5,110,597, respectively. Pottery also reached its maximum value, $33,784,678, in that year. The highest value of common brick was reached in 1905, the figure for 1910 ($55,219,551) being within 10 per cent. of the maximum. Vitrified paving brick showed an almost steady gain, its maximum value, $11,269,586, being reached in 1909, the value for 1910, $11,004,666, being a slight decrease. Front brick doubled its value from 1901 to 1909, but the 1910 figures, $8,590,057, showed a decline. Enamel brick also decreased in value in 1910, at $832,225, after more than doubling its value from 1901 to 1909. Sewer pipe reached its maximum value in 1907, though the value of the 1910 production, $11,428,696, shows but a small decrease. Tile, other than drain, after considerable variation, showed a large gain in 1909 at $5,291,963, and a small decrease in 1910 to $5,240,644.

Items of Interest
FROM VARIOUS LOCALITIES.

MR. WM. F. DOELKER, who, during 1910–11, capably managed "the outside" section of the tradings of the Mt. Clemens (Mich,) Gas Light Company, has been appointed New Business Manager for the Ottumwa (Ia.) Gas, Light, Heat and Power Company. He assumed his new duties the 1st inst. Mr. Doelker's many friends in Mt. Clemens are sorry over his going out from them—had he remained there it is more than likely he would be the candidate of the Republicans for the position of Mayor at the next municipal election—but they are nevertheless of the type *usque ad aras*, in that if promotion parts them they are pleased to know that he benefits.

"DEAR JOURNAL: * * * I do not write for publication; but, believing you might be interested, having read your comment on the Syracuse (N. Y.) output figures, as printed in to-day's JOURNAL, I remember that the maximum output there in 1895 (the year of the retirement of the late Mr. Austin C. Wood from the post of Engineer to the Company) was 1,011,600 cubic feet. The half-million figure was reached in the early 80's. Hence one can determine the percentage increase (bearing in mind that a number of outlying districts have been absorbed since 1895), and having so determined, the thought must come that some of 'The Old Guard, God bless 'em,' were not far behind the up-to-dates in achievement. * * * B. W. B."

MR. ARTHUR D. LITTLE, President and General Manager of Arthur D. Little, Inc., 93 Broad street, Boston, was elected President of the American Chemical Society at the Washington meeting. He had filled (and most acceptably) the position of Vice-President to the Society, and was also Chairman of the Division of Industrial Chemists and Chemical Engineers. He is a graduate of the Mass. Inst. Tech., Class of '85, and is President of the "Section on Starch, Glucose and Paper," which will figure largely in the International Congress of Applied Chemists, the next assemblage of which will be in this country. A very notable paper by him was that on "The Earning Power of Chemistry," read last year at the Indianapolis meeting of the American Chemical Society.

A CORRESPONDENT in Millville, N. J., writing under date of the 29th ult., informs us that Mr. D. J. Franklin, General Manager of the Millville Gas, Water and Electric Companies, tendered a Yuletide Feast to a score of his office employees and foremen, the scene of the festivities being at his handsome home, 118 North Second street, the evening of the 27th December. The Christmas decorations of the Franklin household were forceful reminders of the holiday-time, and served as appropriate decorations for the table and the entertainment stage. A well-selected series of appetizing things (and destroyers of appetite as well) were listed on a handsome menu card, beginning with 'Maurice River Coves on the half,' and terminating in 'After-dinner mints,' was the prelude to a roster of toasts and songs, both dinner and entertainment being much enjoyed. The Owen, the Carroll, the Carr and the Lee quartettes, respectively, rendered these selections: 'Timbuctoo,' 'Mysterious Rag,' 'All Alone,' and 'Put on Your Old Gray Bonnet.' To say that these measures did not enthuse the hearers would be the most positive of untruths. In fact, it was more than surmised that the 'All Alone' delegation was ready to challenge the 'Sweet Singer' of your New York Consolidated Company's Society of Gas Engineers to contest for the palm in respect of rendering that ballad. After the ceremonies, a Social and Beneficial Club, composed of the employees of the Millville Utility Companies' was organized, and these officers were chosen: President, Mr. N. G. Livermore; Secretary, Mr. G. L. DeHuff; Committees, charged with drafting by-laws and arranging for monthly meetings. Manager Franklin, whose direction of the entire proceedings was remarkable for its cleverness, as a benediction declared that the Companies would pay into the treasury each year a sum equal to that represented by the annual dues of the membership. Thus was started on a firm footing the first Gas Club organized in the Millville section of New Jersey."

"M.," WRITING from St. Louis, says: "Reports have it that the projectors of the Edwardsville (Ills.) Gas Company have arranged to begin construction work the 1st prox. * * * The St. Clair County Gas and Electric Company, of East St. Louis, Ills., will lay a 6-inch, high pressure line from East St. Louis to Collinsville, Madison county, a distance of about 12 miles, work to start sometime this week. * * * Mr. D. W. Jardine, of the St. Clair Company is enjoying himself for a month in Canada. He is surely a mighty hunter. * * * Mr. J. T. Jones, Superintendent of the St. Clair Company since 1905, has been transferred from East St. Louis to Bangor, Me. I regret to say that ill-health occasioned the change. * * * Mr. Gray, for some time in charge of the new business division of the Belleville (Ills.) division of the St. Clair Gas and Electric Company, has resigned from its service. He did not make known his plannings for the future."

DIRECTOR R. N. BRACKETT, Department of Chemistry, Clemson (S. C.) Agricultural College, writing under date of the 20th ult., says: "While in Columbia, S. C., during the State Fair last October, it was my privilege to visit with my Class in Industrial Chemistry, and some of the members of this Department, several industrial plants. Perhaps the most interesting of these visits was to the hydro-electric, reserve steam plant and gas plant of the Columbia Railway, Gas and Electric Compsny. Through the courtesy of the management, and under the conduct of the enthusiastic and intelligent Superintendent (Mr. S. W. Brown) we were given every opportunity to make a thorough inspection of the gas plant. Mr. Brown spared neither time nor patience in explaining every detail of the plant, and in showing us every part of its workings in active operation. It had not been my good fortune to have visited a plant of this sort at a prior time, but if its efficiency can be measured by the intelligence and enthusiasm of the Superintendent, and by the neatness and perfect order in which every part of the work is conducted, then the people of Columbia have nothing to complain of. Mr. Brown impressed us as a man thoroughly familiar with every detail of the plant and its workings, and as having the keenest interest in the perfection of its operations."

TREASURER MORGAN announces that the regular dividend of 2½ per cent. for the last half year on the preferred shares of the United Gas and Electric Company is payable the 15th inst.

A DELAYED announcement, from Treasurer Corscot, of the Iowa City (Ia.) Gas and Electric Company, incloses a clipping from the Richmond (Va.) *Times-Dispatch*, the main points in which are to the effect that Dr. Werner von Bolten, a prominent member of the

chemical staff of the huge shops, in Berlin, Germany, of the Siemens-Halske Company, has discovered a method of making diamonds. His process is based on the decomposition of lighting gas by "a mercury amalgam, whereby the carbon of the gas is crystallized into diamonds." It is admitted that "the diamonds" are extremely minute, but that they can be "built up into larger ones." It is further admitted that the process is still in "the experimental stage." Remarking further on this, Mr. Corscot says -and we agree with him: "This may be of interest to your readers, and incidentally to gas consumers, inasmuch as many of these hold the belief that they are not getting value received. Let us hope they will all take this experiment seriously and at once 'get busy' in an effort to increase their financial income!"

THE last week in December, in the office of Mr. W. F. Holt, of Redlands, Cal., the Directors of the Imperial Valley Gas Company, voted to increase the capital stock to $500,000, an increase of 400 per cent.

THE residents of Fullerton, Anaheim and Orange, Cal., acting through the Trustees of the named places, have petitioned the proprietors of the Southern Counties Gas Company to reduce the selling rate to $1 per 1,000 cubic feet, which rate they allege is that charged in the comparatively nearby district of Santa Ana.

"THAT Mr. George W. Eccles, for some time Constructing Engineer to that sterling New England corporation, the Davis & Farnum Manufacturing Company, seems to have fitted in well with the purposes of that concern, would look assured from the new business enjoyed by it during the year just closed. In fact 1911 went out with laurels rather than with smilax, so far as active business was concerned. In proof of this the last week in December these contracts came their way: For the South Framingham (Mass.) Gas, Fuel and Power Company a storage holder (to rest in steel tank) up to retaining 250,000 cubic feet; also, a double-lift holder (to rest in steel tank) for the Portsmouth (N. H.) Gas Company. This latter vessel is rated at 100,000 cubic feet. I can also truthfully say that the outlook in New England for construction work, in one respect or another, seems brighter than at any other period within the last 10 years.—C."

THE American Gas Company, of Philadelphia, has added another plant to its possessions through the purchase, from Dawes Brothers and Mr. I. C. Elston, Jr., of the Citizens Gas and Electric Company, of Iowa. The negotiations for the sale of this property were completed the 28th ult., by Mr. Morris W. Stroud, President of the American Gas Company, with Mr. I. C. Elston, Jr., of Detroit, representing himself and the Dawes Brothers, of Chicago. The Citizens Gas and Electric Company furnishes all the gas and electric currents demanded by the residents of Waterloo and Cedar Falls, serving a population of over 40,000. To show how the named centers are growing it might be noted that, according to the U. S. Census figures of 1910, the population of the territory during the prior decade had increased 125 per cent.

THE Gas Machinery Company, of Cleveland, O., has been awarded a contract by the proprietors of the Austin (Minn.) Gas Company for water gas apparatus, exhauster, tar extractor, station meter, governor connections and miscellaneous machinery to be installed in the new buildings recently erected by the Gas Company. Mr. Z. T. F. Runner, President of the Austin Gas Company, has practically rebuilt the entire plant since he recently took control thereof, and the residents of Austin seem to appreciate the excellent service that Mr. Runner's Company is giving them.

WHILE on the matter of contracts recently awarded the Gas Machinery Company, it is also in order to note that it has signed up to furnish silica retorts and settings to these gas plants: Sterling, Kewanee and De Kalb, Ills.; Wausau, Wis.; Rochester, N. H.

"DEAR JOURNAL: Why is it that our only paper did not print something about the annual bazaar at New Bern, N. C., last month. Do I hear you say, 'Didn't know anything about it!' Of course, that lets you out; but in fact the bazaar was really the greatest social occasion of the season. It was managed or directed by the ladies of the First Baptist Church, and was held in the business headquarters of the New Bern Gas Company. It was a rousing success, and gas had quite a boom as a cooking agent during the continuance of the bazaar. It was so handy with which to turn out deliciously crisp biscuits, crumpets, small cakes; to boil with, to bake with, to say nothing about roasting. The 'cookeresses' made candy and coffee, and the guests voted unanimously that gas was the greatest ever fuel. The New Bern Company further ingratiated itself with the women folks by allowing them the use of meeting hall, free use of appliances and utensils, and free fuel.—B. N. O."

TORONTO, CANADA, is proposing to pass an ordinance which will govern the methods to be followed in the lighting of hotels and other lodging houses. The City Solicitor, when asked for his views respecting the proposed action said that, if it were considered desirable, such places might be refused licenses, unless certain lighting practices were observed; but he did not think the city had power to pass a binding by-law of the nature suggested.

"B. W.," writing from Atlanta, Ga., under date of Dec. 29th, says: "It seems assured that Mr. W. A. Dobson, of Americus, Ga., and Mr. C. Bradford Frailey, of Philadelphia, will raise the capital necessary to the construction of the gas plant proposed by them for Cordele, Ga. The franchise was granted them about 1 month ago."

LAST month the people controlling the electric lighting supply of Rome, Ga., managed, in one way or another, to so fascinate the editorial end or middle of the local newspaper known as the *Tribune-Herald*, that a leader was printed, calling attention to and extolling the virtues of "a new electric range" some of the main points in which were like these: Being of the storage electric type it kept the heat going through the stove continually, so that 500 watts would heat it up, and after it once got warm, there would be little drain on the power current in heating it up—provided there were any current left. The last six words are ours. Again, returning to our wonder: The sum of $5 per month would heat up the stove and do the work for a large family—kind of work and number in family not specified. Again, the last nine words are ours. There was quite a bit more of the sort of slush herewith reproduced. However, and quite naturally, the oddity of the editorial statement (not to say the absurdity thereof) attracted the attention of Mr. Ferrier, whose privilege it is to supply the Georgian Romans with gas: It seems that Mr. Ferrier could not obtain space in the editorial section of the aforesaid newspaper—indeed he could hardly expect that, for editorials are of the "we" and "us" order—but the publishers were easily induced to grant him space in the advertising columns, and in good, bold-faced Roman letters, he formulated a rejoinder to the editorial which read like this:

"The Evolution in Cookery."

Under the above caption there appeared in this paper, a few days ago, a reprint of an article in the Augusta *Herald*, giving a description of a cooking apparatus, which surely promises to be interesting from both a theoretical and a practical standpoint. It is to be operated with a subtle current from our harnessed waterfalls. It is to be heated up by 500 watts, and after that, never gets cold, but just obligingly keeps warm "with little drain on the power current," and allows the jaded housekeeper to have a good time—in fact

"Its one of those things that give you the notion
That you have discovered perpetual motion."

Now, gentle reader, do you know how much heat you can get from 500 watts? No! Well, just about 29 heat units. And, what is a heat unit? Just for illustration, draw a gallon of water from the faucet at this time of the year, and you cannot, to save your life, get it to boil unless you add over 1,300 heat units to it. Now, you understand. And this marvellous contrivance is going to start on 29 of those units and "Keep a going." After we get it, perhaps the Augusta *Herald* may be induced to send its wonder-worker over here to repeat the miracle of the loaves and fishes which would be a great boon to the poor people of Rome, at this time and tide.

ISN'T it surprising that the gas stove holds its own, although it cannot get a word of favor edgewise, unless the shekels are forthcoming, while all kinds of of nostrums receive free boosting? There are reasons and here is one of them

We are selling 50,000 Heat Units
for 10 cents,

and then follow the signature of the Company, and the place of its abode.

The Market for Gas Securities.

Well; it is good-bye to Wyatt, *et al.*, who are now engaged in the initial steps of the phœnix-like sort. Come to think of it, however, the steps are realy initial-final ones, in that they are retiring to their burrows in sackcloth and ashes. It is likely that the Company will pay considerable attention from now to the developing of the pensioning (rather the annuity-izing) of its men. Surely, the shareholders may say to the Cortelyou-Adricks-Carter-Bradley combination, "Well done, thou good and faithful servants." Consolidated for the week shows a gain of 3¼ points in the bid. It came in to-day (Friday) at 141¼ to 142.

Brooklyn Union also responded to the striking failure by advancing about in equal step with Consolidated. It is 140½ to 141. Laclede common scored a gain of 3 points, Peoples, of Chicago, advanced 1, and Massachusetts gas (common and preferred) did likewise. As was to be expected the shareholders in the Municipal Gas Company, of Albany, N. Y., and those in its twin corporation (the Troy Gas Company), assented to the proposed increases in their respective capital stocks. The former will go from $2,000,000 to $6,250,000; the latter from $1,000,000 to $3,000,000. Large as these figures seemingly look, the real facts as to both are that each could be granted an additional million, and still be within reasonable capitalization lines. U. G. I. shares show important gains in recent quotations, which is not to be wondered at when one knows that its net earnings for the year were virtually 7½ millions dollars. Secretary Jelliffe, of the American Light and Traction Company will pay these dividends: Common, 1½ per cent. (quarterly), the 1st prox.; a 2½ per cent. (quarterly) on the common; and an extra dividend of 2½ shares common on each 100 shares thereof outstanding.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

115 BROADWAY, NEW YORK CITY.

JANUARY 8.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share:

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked*
Consolidated Gas Co.	$78,177,000	100	141¾	142
Central Union Gas Co.—				
1st 5's, due 1972, J. & J.	3,000,000	1,000	103	105
Equitable Gas Light Co.—				
Con. 5's, due 1932, M. & S.	1,000,000	1,000	105	106
Mutual Gas Co.	3,500,000	100	155	165
New Amsterdam Gas Co.—				
1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	100	101½
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	35	50
1st Mtg. Gold Bds. 5 p. ct.	1,000,000	—	98½	100½
New York and East River—				
1st 5's, due 1944, J. & J.	3,500,000	1,000	103	105
Con. 5's, due 1945, J. & J.	1,500,000	—	95	100
Northern Union—				
1st 5's, due 1927, J. & J.	1,250,000	1,000	94	100
Standard	5,000,000	100	60	70
Preferred	5,000,000	100	90	100
1st Mtg. 5's, due 1930, M. & N.	1,500,000	1,000	103	105
The Brooklyn Union	15,000,000	1,000	140¼	141
1st Con. 5's, due 1948, M. & N.	15,000,000	—	106¾	107
Yonkers	299,650	500	130	—
Out-of-Town Companies.				
Bay State	50,000,000	50	⅛	¾
" Income Bonds	2,000,000	1,000	—	75
Binghampton Gas Works	450,000	100	—	—
" 1st Mtg. 5's	500,000	1,000	97	100
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	5	8
Bonds, 5's	5,250,000	1,000	50	60
Capital, Sacramento	500,000	50	—	35
Bonds (6's)	150,000	1,000	—	—
Chicago Gas Co. Guaranteed Gold Bonds	7,660,000	1,000	104	106¼
Cincinnati Gas and Electric Co.	29,500,000	100	87	90
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	96	8
Columbus (O.) Gas Lt. & Heating Co.	1,682,750	100	90½	91
Preferred	3,026,500	100	75½	80
Consumers, Toronto	2,700,000	50	200	204
Consolidated, Baltimore	13,460,084		—	—
Mortgages, 5's	3,400,000		—	—
General Mortgage 4½	10,661,000		—	—
Con. Gas Co., Baltimore City, 4½	2,751,000		—	—
Consolidated Gas Co. of N. J.	1,000,000	100	15	—
Con. Mtg. 5's	976,000	1,000	94	96
Bonds	75,000	—	—	100
Denver Gas and Electric	3,500,000	—	65	67
Detroit City Gas Co.	6,580,000	—	—	50
" Prior Lien 5's	5,619,000	1,000	97	100½
Detroit Gas Co., 5's	381,000	1,000	75	80
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	—	101
Essex and Hudson Gas Co.	6,500,000	—	133	136
Fort Wayne	2,000,000	—	—	—
" Bonds	2,000,000	—	55	—
Grand Rapids Gas Light Co., 1st Mtg. 5's	1,350,000	1,000	100	101
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	—	130	138
" Bonds, 5's	10,500,000	—	104	106
Indianapolis	2,000,000	—	—	38
" Bonds, 5's	2,650,000	—	104½	105
Jackson Gas Co.	250,000	50	82	—
" 1st Mtg. 5's	290,000	1,000	97	100
Kansas City Gas Light Co., of Missouri	5,000,000	100	—	36
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede Gas Co., St. Louis.	10,000,000	100	107½	108
Preferred	2,500,006	100	114	120
Bonds	10,000,000	1,000	102¾	103
Lafayette Gas Co., Ind.	1,000,000	100	—	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	143	145
Madison Gas and Electric Co.				
" 1st Mtg. 6's	400,000	1,000	106	108¾
Massachusetts Gas Companies, of Boston	25,000,000	100	90¾	91
Preferred	25,000,000	100	94¼	94½
Montreal Gas Co., Canada	2,000,000	100	218	218¾
Nashville Gas Light Co.	1,000,000	100	110	—
Newark, N. J., Con. Gas Co.	6,000,000	—	97	98
Bonds, 6's	6,000,000	—	127	128
New Haven Gas Co.	2,000,000	25	200	—
Peoples Gas Lt. & Coke Co., Chicago	25,000,000	100	104	104¼
1st Mortgage	20,100,000	1,000	102	102½
2d "	2,500,000	1,000	104	—

MEETING TIMES OF THE VARIOUS GAS ASSOCIATIONS.

American Gas Institute.—Annual meeting, October 16 to 18, 1912. Atlantic City, N. J. Officers: President, Ira C. Copley, Aurora, Ills. Secretary, Geo. G. Ramsdell, 29 West 39th st., N. Y. City.

Canadian Gas Association.—Annual meeting, ———— Officers President, Arthur Hewitt, Toronto, Ont.; Secretary and Treasurer, John Keilior, Hamilton, Ont.

Empire State Gas and Electric Association.— nnual meeting, New York City, Oct. 1912. Officers: President, R. M. Searle, Rochester, N. Y.; Secretary, C. H. B. Chapin, 29 W. 39th street. New York City.

Guild of Gas Managers of New England.—Annual meeting, March, 1912. Young's Hotel, Boston; monthly meeting, second Saturday. Officers: President, Walter G. Africa, Manchester, N. H.; Secretary, H. K. Morrison, Brockton, Mass.

Illinois Gas Association.—Annual meeting, time, March, 1912, Chicago, Ills. Officers: President, C. B. Strohn, Elgin, Ills.; Secretary-Treasurer, F. E. Newberry, Dixon, Ills.

Illuminating Engineering Society.—Annual meeting, Sept. ————1912, ———— Meetings of Sections, monthly. Pres't, A. E. Kennelly, Boston, Mass.; Secretary, Preston S. Millar, 29 W. 39th street, N. Y. City. Sections: New York, Secretary, Albert J. Marshall, 16 East 40th street. New England, Secretary, H. C. Jones, 10 High street, Boston, Mass. Philadelphia, Secretary, L. B. Eichengreen, Broad and Arch streets. Chicago, Secretary, A. L. Eustice, 105 North Wabash avenue.

Indiana Gas Association.—Annual meeting, Jan. 17 and 18, 1912, Indianapolis. Officers: President, S. E. Mulholland, Fort Wayne; Vice-President, Howard L. Olds, Indianapolis; Secretary-Treasurer, Philmer Eves, Indianapolis.

Iowa District Gas Association.—Annual meeting, time, May, ——, 1912; Lincoln, Neb. Officers: President, G. W. Clabaugh, Omaha, Neb.; Secretary and Treasurer, G. I. Vincent, Des Moines, Ia.

Kansas Gas, Water and Electric Light Association.—Annual meeting, time, Sept. 1912. Manhattan, Kas. Officers: President, B. F. Eyer, Manhattan, Kas.; Secretary and Treasurer, J. D. Nicholson, Newton, Kas.

Michigan Gas Association—Annual meeting, time, Sept. ————1912;———— Officers: President, F. W. Blowers, Kalamazoo, Mich; Secretary-Treasurer, Glenn R. Chamberlain, Grand Rapids, Mich.

Missouri Electric Light, Gas, Water Works and Street Railway Association.—Annual meeting, April, 1912; St. Louis, Mo. Officers: President, F. E. Murray, Louisiana, Mo.; Secretary and Treasurer, N. J. Cunningham, Springfield, Mo.

National Commercial Gas Association.—Annual meeting, December, 1912 Atlanta, Ga. Officers: President, C. L. Holman, St. Louis, Mo.; Secretary, Louis Stotz, 29 West 39th street, New York City.

Natural Gas Association.—Annual meeting, May, 1912, Kansas City, Mo.; Officers: President, A. B. Macbeth, Independence, Kas. Secretary, T. C. Jones, Delaware, O.

New England Gas Association.—Annual meeting, February, 14th and 15th, 1912 Boston. Officers: President, J. A. Coffin, Gloucester, Mass.; Secretary-Treasurer, N. W. Gifford, East Boston, Mass.

New Jersey State Gas Association.—President, William H. Pettes, Newark, N. J.; Secretary-Treasurer, Arthur H. Osborn, Belmar, N. J.

Ohio Gas Association —Annual meeting, February 6 and 7, 1912, Columbus, O.; President, John M. Garard, Columbus, O.; Secretary-Treasurer, T. C. Jones, Delaware, O.

Oklahoma Gas, Electric and Railway Association.—President, Noel R. Gascho, Alva Okla.; Secretary, H. V. Bozell, Norman, Okla.

Pacific Coast Gas Association.—Annual meeting, Sept. ————1912, ———— ——Officers: President, W. Baurhyte, Los Angeles, Cal.; Vice President, Henry E. Adams, Stockton, Cal.; Secretary-Treasurer, John A. Britton, 445 Sutter street, San Francisco, Cal.

Pennsylvania Gas Association.—Annual meeting, Williamsport, Pa., April 8-10, 1912. Officers, President, C. W. Butterworth, Philadelphia, Pa; Secretary-Treasurer, William H. Merritt Lebanon, Pa.

Society of Gas Lighting.—Annual meeting, Dec., 13, 1912; monthly meeting, second Thursday. Place, New York City. Officers: President, Fred. S. Benson; Secretary, George G. Ramsdell, 254 West 39th street, New York city.

Southern Gas Association.—Annual meeting, April, 1912, Jacksonville, Fla. Officers, President, H. B. Hoyt, Jacksonville, Fla.; Secretary-Treasurer, E. D. Brewer, Atlanta, Ga.

Southwestern Electrical and Gas Association.—Annual meeting, April 27, 28, 29, 1912; Houston, Tex. Officers: President, J. E. Carroll, Beaumont, Tex.; Secretary, D. G. Fisher, Dallas, Tex.

Wisconsin Gas Association.—Annual meeting, May 15 and 16, 1912, Milwaukee, Wis. Officers: President, H. M. Buck, Waukesha, Wis.; Secretary-Treasurer, Henry Harmon, Milwaukee, Wis.